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97

CONTRIBUTORS TO VOLUME XLIV

ALLEN CLYDE I	690	DAVIS RICHARD T	836	HORNITZ ALEC	355
ALLISON NATHANIEL	43	DAVIS WILLIAM THORNHALL	84	HUNT, VERNIE C	271
ANDREWS EDMUND	30	DEAYR JOHN B	101	HUTCHINS ELLIOTT H	225
		DEELMAN H J	supp ii 247		
BACON C S	281	DE TALATS GEZA	501	JACKSON ARNOLD S	406
BALFOUR DONALD C		DENTYE II B	85	JACKSON CHEVALIER	705
	269 650 supp ii 103	DE VRIE W M	supp ii 217	JOHN II J	190
BALLON HARRY C	1	DOWD CHARLES A	397	JOHNSON ARTHUR C	831
BASTIANELLI RAFFAELE	supp ii 5	DUBLIN LOUIS I	supp ii 174	JUDO E STARR	169 601
BELL LEO P	556	DUBOIS CHARLES	supp ii 60	JUDIN SIECEY	530
BERARD LEON	supp ii 39	DUNCAN GARFIELD G	253		
BENLEY FREDERIC A	3 2			KAHN MAURICE	569
BEUTNER O	115	FISENDRATH DANIEL A	317	KAMPMEIER OTTO J	30
BIERICH ROBERT	supp ii 141	FRANC JAMES	supp ii 103	KALZMANN MARK	15
BLALOCK ALFRED	61	FURCHILD FRED R	119	KELLY JOSEPH D	687
BLAND-SUTTON JOHN	supp ii 14 17	FARR CHARLE L	155 61	KILLIAN JOHN A	490
BLOODGOOD JOSEPH COLT		FIBIGER JOHANNES	supp ii 17	KIRKHAM H I D	244
	413 838 supp ii 152	FRANKLIN WALTER SCOTT	701	KIRSCHNER M	341
BLUMENTHAL FERDINAND		FRASER JOHN	289	KLEMPERER PAUL	489
	supp ii 93	FROST IGNAIS I	233	KOLODNY ANATOLE	supp 1
BONGARDT HENRY F	390			KRETSCHMER HERMAN L	163
BOTHE FREDERICK A	61	CIBSON JOHN H	842		
BOWING HARRY H	416	CILE HAROLD H	230	LANGE IRTZ	425 668
BRASCHER WILLIAM F	433	GILMAN EARL M	414	LANGROCK EDWIN G	39
BRAMS WILLIAM A	301	GINZBURG LEON	344	LAWSOON JOHN D	11
BRODHEAD GEORGE L	39	GRAHAM EVARTS A	153	LECHNE P	805
BROOKE JOHN A	03	GREEN JOHN A	401	LEE BROWN R A	753
BROWN ALFRED		GREENOUGH ROBERT B		LEITCH ARCHIBALD	supp ii 208
	133 284 4 0 574 717 844		supp ii 108	LEWIS DEAN	108
BUNT WARNER S	1 3	GUY CHESTER	301	LEWIS HENRY E	130
BUNNELL, STERLING	14			LEWISOON RICHARD	344
		HAAGENSEN CUSHMAN D	8 4	LILJENTHAL, HOWARD	supp ii 308
CAMPBELL MEREDITH F	311	HAGER BENJAMIN H	433	LINDSAY W S	646
CARTER R FRANKLIN	74	HANDLEY W SIMPSON	supp ii 22	LUEDDE WILLIAM H	772
CARY E H	70	HARRISON TINSLEY RANDOLPH	617		
CHANDLER L R	328	HARTMAN HANS	308	MAGOUN JAMES A	101
CHURCHILL, EDWARD D	483	HARTMANN HENRI	supp ii 31	MAISIN J	supp ii 68
CLUTE HOWARD M	23	HEAD JEROME R	262	MAKIE T	supp ii 47
COLF RALPH	833	HENSEL MAY	365	MATAS RUDOLPH	424
COOLEY C L	325	HENRY J STEWART	637	MATTISON JAMES A	113
CORDES FREDERICK C	01	HEPURN THOMAS A	400	MAVO WILLIAM J	
CORNELL EDWARD L	211	KEYD CHARLES GORDON	439		128 340 707 839
COYLE M H	123	KELLS DAVID S	280	M'ARTHUR LEWIS L	418
CRAG R GORDON	753	KENMAN FRANK	571	M'GINNIS R S	232
CUSHING HARVEY	721	HITZROT JAMES MORLEY	571	M'GLANNAN ALEXIUS	390
		HOPFAUER J	829	M'NEIL DONALD	483
		HOLLENDER A R	123	M'WHORTER GOLDSER L	247
DALAND ERNEST M	264	HOLMAN EMILE	318	MELICOW M M	230
D'ALLAINES G	805	HORNER D A	194	MEYER HERBERT WILLY	53
DARNER H LAURAN	105	HORSLEY J SHELTON	215	MEYER KARL A	301
DAVIS JOHN STAIGE	181				

MILLER A MERRILL	117	RODMAN JOHN STEWART	128	SUMMERS JOHN E	374
MILLER NORMAN F	550	ROSSY GUSTAVE	supp ii 185	SWEET J E	811
MILLS H W	5 7				
MOISE, THEODORE S	824	SALTSTEIN HARRY C	supp ii 209	THOMTSON W M	290
MONTGOMERY ALBERT H	424	SCHAEFER J F	411	TOLSON HOWARD L	43
MORRISON JOHN H	671	SCHLOPPEL H	90	TRAUTMANN MILTON	61
MURRAY J A	supp ii 195	SCHREINER BERNARD F	608		
MURRAY MARY	690	SEIBS J V	231	VOGT EDWARD C	8 4
		SEMKEN GEORGE H	supp ii 281		
ORR, THOMAS G	810	SEVER JAMES WARREN	547	WALTERS WALTER	840
		SHACKLETON WILLIAM E	634	WARREN J COLLINS	73
PLEET MAX MINOR	90	SHEARD CHARLES	126 567	WEBER ISAAC MERRIN	756
PERRET CH A	378	SHURLY BERT R.	766	WEENS J H	478
PHANEUF LOUIS E	788	SINOW HAROLD C	169 601	WELSH WILLIAM H	supp ii 11
POLAK JOHN O'BORN	520	SLOCUMB LEITH H	359	WESSON MILFY B	208
		SMITH LAWRENCE WELD	23	WHITAKER LESTER R	463
REGAUD CLAUDE	supp ii 116	SOPER GEORGE A.	supp ii 5 148	WILKIE D P D	529
REIS RAUPH	130	SPEED KELLOGG	419 468	WILSON LOUIS B	710
RESNIK ERNEST D	563	SPURLING ROY G	463	WOOD FRANCIS CARTER	
REVERDIN ALBERT	supp ii 66	STEEL WILLIAM A	393		5 pp 20 318
RHODES PAUL	131	STENSTROM A. T	608	WYETH GEORGE A	95
RICHTER H M	612	STEWART COLIN C.	612		
ROBBINS HOLDEN J	612	STRAUB GEORGE F	676	ZIMMERMAN L M	627

SUBJECT INDEX TO VOLUME XLIV

- MEN** Involuntary nervous system in relation to genital disease 289
- Mitoses** Two cases of pregnancy with bicornuate uterus 170 Uteropyelography 433
- Baldwin** operation for formation of artificial vagina report of cases 530 Hemorrhagic cyst of the kidney 601
- Neurological problems** 70
- Nycturia** Relation of postoperative achlorhydria to cure of gastric and duodenal ulcers 344
- Intine epithelioma** 173
- George** Surgery and the international spirit 426
- Can College of Surgeons—**
- boards on medical motion picture films and traumatic surgery** ed 123
- Clinical Congress of Surgeons—**Report of sixteenth annual meeting of the Montreal Canada 139
- Motion Picture Films—**For the teaching of medicine surgery and allied sciences 142
- Registry of Bone Sarcoma—**See supp 1
- Retina—**Prevent's address—Surgery and the international spirit (Matas) 424
- Traumatic surgery** 143
- American Society for the Control of Cancer—**For report of international Symposium held under auspices of American Society for Control of Cancer Lake Mohonk New York September 20-24 1916 see supp 11 The organized movement for the control of cancer in America supp 11 143 Resolutions passed at meeting held September 20-24 1916 supp 11 127
- Amputation** Baseball cover flaps in leg and thigh 810
- Anemia** Sunlight and ultraviolet radiation ed 16
- Litho encsis of jaundice** 459
- Anesthesia** Primary thyroidectomy for exophthalmic goiter with a report of one hundred and twenty cases 406 Splanchic anesthesia a critical review of the theory and practice of this method 301 Ethylene oxygen anesthesia report of 250 cases 690
- Andrews & Wyllis** memoirs 418
- Anio-Endothelioma** Bone sarcoma supp 1 163
- Ankle** Arthrodesis of the ankle 66
- Anus** Artificial Technique of colon resection 90
- Appendicitis** Use of mercurochrome 220 soluble in peritoneal and other cavities for sepsis 836
- Appendix** Living tendon suture in appendiceal technique 117 Education in vital capacity after operation 483
- Arm** Swollen after breast operations Untreated cancer of breast 264 cor 414 Tendon transplantation 455
- Obstetrical paralysis** 547
- Arthrodesis of the ankle** 66
- BACKFLOW** Pyelovenous at time of pyelography 592
- Bacteriology** Value of co-ordinated effort in the control of cancer supp 11 17
- Baldwin** operation for formation of artificial vagina report of six cases 530
- Balkan frame** and its use in general surgery 831
- Baseball** cover flaps in leg and thigh amputations 810
- Bassini** operation modified technique for difficult inguinal hernia 261
- Belgium** Anti-cancer campaign in supp 11 68
- Bell** method of treating cancer supp 11 318
- Bell** Hutter operation with ovarian conservation or grafting cor 138
- Bile** Duodenal fistula effect of loss of gastric, duodenal pancreatic and biliary secretions from body ed 840
- Bile ducts** Experimental study of lymphatic theory of pancreatitis 15
- Biliary tract** Experimental study of operation of choledochostomy 612
- Bilruban** Patho encsis of jaundice 489
- Biochemistry** Value of co-ordinated effort in control of cancer supp 11 17
- Biopsy** Cancer as a specialty supp 11 81
- Bladder** Clinical importance of Buck's and Colles' fasciae 68 Use of seton in repair of torn or strictured urethra new method with report of two cases 24
- Enterovesical fistula** 753 Use of mercurochrome 220 soluble in peritoneal and other cavities for sepsis 836
- Blood** New apparatus for the transfusion of untreated 62
- Patho encsis of jaundice** 489 Biological action of light ed 567 Effects of thyroidectomy and thyroid feeding on cardiac output study number four on regulation of circulation 617 Latent postoperative tetany 627 Duodenal fistula effect of loss of gastric duodenal pancreatic and biliary secretions from body ed 840
- Blood pressure** Ethylene-oxygen anesthesia report of 2750 cases 690
- Blood vessel** Compression of duodenum by mesentery and superior mesenteric vessels underlying cause of acute gastric dilatation 359 Pyelovenous backflow at time of pyelography 592 Chronic rhinopharyngeal disease 66
- Bone tuberculosis—**Use of iodized oil in the demonstration of empyema cavities and fistulous tracts 11 Evidence of value of education in the control of cancer supp 11 155 Heliotherapy in surgical tuberculosis 15 743
- Bone graft** Recurrent anterior dislocation of the shoulder operative cure by bone graft 468
- Bone sarcoma** Not complete discussion see supp 1
- Bone suture** Technique of open reduction of fractures 541
- Bowel** Treatment of annular gangrene of small bowel by invagination versus resection 374 Mesentery of Enteromesenteric cysts 401
- Bradycardia** study based on five hundred cases in Chicago 1910
- Brain** Experience with orbito ethmoidal osteomata having intracranial complications with report of four cases 11 Unilateral atrophic optic neuritis 784
- Breast** Swellings of male 30 Untreated cancer of 264 cor 414 End results in five hundred and sixty three cases of breast cancer 608 Evidence of value of education in control of cancer supp 11 155 Prevention of cancer supp 11 163
- British Empire Cancer Campaign** Cancer education in England supp 11 22
- Broder's** index of malignancy Grades of malignancy in primary carcinoma of the gall bladder 36
- Bronchi** Studies in pulmonary suppuration 128
- Bronchiectasis** Value of lipiodol in diagnosis and treatment of abscess of lung 1 Experimental studies in pulmonary suppuration 128
- Bronchoscopy** Value of lipiodol in diagnosis and treatment of abscess of lung 2 Bronchoscopy and cesophagoscopy brief consideration of technique 93

Buck's fascia Clinical importance of 205

Burns Some details in repair of cicatricial contractures of neck 396

CECSTOMY for paralytic ileus following extraperitoneal operation ed 51

Cesarean section followed by temporary externalization of the uterus the Forbes operation 355

Calculi Prostatic True clinical data based on seventy cases 163

Cancer Newer developments of electrothermic methods in treatment of neoplasms 9 Cancer problems ed 340 Carcinoma of rectum and rectosigmoid factors influencing choice of operative technique 556 Grads of malignancy in primary carcinoma of the gall bladder 56

Cancer Control Report of International Symposium see suppl 11 Resolutions passed at meeting, supp 11 327

Cancer diet Prevention of cancer supp 11 163

Carcinoma Rectal immunity Influence of carcinoma of uterus among Jewish women 355 Danger of incomplete removal of small and apparently innocent lesions cor 413 of rectum and rectosigmoid factors influencing choice of operative technique 556 Variations in prognosis of endometrial carcinoma as indicated by histological structure 646

Cardiac output Effects of thyroidectomy and thyroid feeding on 617

Cardiomyopathy for mediastinopericarditis report of case 113

Cartilage Costal New method of obtaining costal for plastic and reconstruction surgery 637

Cellular theory of cancer How we should regard new theories of origin of cancer supp 11 83

Cervical changes of open reduction of fractures 341

Chemical agents How we should regard the new theories of the origin of cancer supp 11 185

Ches. Gynecological Society 1910 240

Childbirth Laceration previa a study of one hundred and thirty-five cases 39

Cholecystectomy Internal drainage of gall bladder as a routine operative procedure report of one hundred cases 303

Cholecystenterostomy Experimental study 612

Cholecystoduodenostomy Internal drainage of the gall bladder as a routine operative procedure report of one hundred cases 303

Cholecystography Present status of and remarks on the mechanism of emptying of gall bladder 155 End results of cholecystography as shown by 373

Cholecystostomy End results of as shown by cholecystogram 403

Cleft palate Improvement of speech in 244

Clinical laboratory Clinical value of certain phases of cancer research supp 11 201

Cohnheim's theory Prevention of cancer supp 11 165

Colles' fascia Clinical importance of 216 and 205

Colon Technique of resection 90

Colostomy Sigmoidostomy after radical operation for rectal cancer 23

Conjunctivitis Radium therapy in some ocular conditions 61

Cranium Unilateral atrophic optic neuritis 84 Tumors of the cavernous ganglion with report of two cases of extracranial carcinoma infiltrating the ganglion by direct extension through maxillary division 203

Laparocephaly with orbito-ethmoidal osteoma having intracranial complication with report of four cases 21

Curettage Danger of incomplete removal of small and apparently innocent lesions cor 412

Cure foundation of Paris What is value of what should be organization and equipment of institutions for treatment of cancer by radium and X rays supp 11 516

Cystic duct Experimental study of operation of cholecystenterostomy 612

Cytocle New method of correcting complete inversion of vagina with or without complete prolapse report of two cases 50

Cysts Hemorrhagic of kidney 601 Hydatid of liver with report of sixty-three previously unpublished cases 577 Mesenteric 401

DANISH General Medical Association for Cancer Research Cancer in Denmark 5 pp 11 77

Deafness Some otological problems 70

Denmark Cancer in supp 11 77 Mortality from cancer among people of different races supp 11 147

Denouville's fascia 205

Dental surgeon Can education in England supp 11 22

Dequay's theory and the International point 430

Diabetes Case illustrating dangers of promiscuous use of insulin tr 13 Hyperinsulinism 60 Papanicolaou and management of surgical diabetes 23

Diagnosis Time in operating room and immediate cooperation of all fluids and pus 535

Diaphragm Traumatic rupture of report of case with recovery following operation 683

Diatheisy Co-operation in the treatment of neoplastic disease ed 416

Diets Preparation and management of surgical diabetic 23

Disease Fibromyosarcoma of stomach in case of neurofibromatosis (von Recklinghausen disease) 305

Duodenal jejunostomy Compression of duodenum by mesentery and the superior vessels 30

Duodenum Pre-operative and post-operative treatment in patients with chronic and duodenal lesions 4 Treatment of chronic duodenal ulcer moderate in all thin ed 203 Relation of postoperative achylia hydro to cure of gastric and duodenal ulcers 344 Complications of by mesenteric and superior mesenteric vessels underlying cause of ulcer gastric dilatation 32

Effect of a ure perforation on course of peptic ulcer 300 Duodenum Effect of loss of gastric duodenal pancreas and bilary secretion ed 840

Dystocia Stuffy bowel on by hundred cases in Chicago Lying Hospital 1910 tr 28

EAR Some otological problems 70

Echinococcosis Hydatid cyst of liver with report of thirty-three previously unpublished cases 57

Esophageal cancer Effect of local use of antitumor agent in the new paper published in antitumor cancer supp 202 Relation of the general patient to cancer problem supp 11 105

Electrocoagulation as a method of nasal surgery and for benign or malignant growths 13

Electrothermy New developments of electrothermic method in treatment of neoplasms 9

Embryology Some otological problems 70

Empyema of uterus Use of iodized oil in demonstration of empyema of uterus and of tubo-uterine acts 1

Endocrine system in chronic inflammatory diseases 711

Endocopy Relation of general patient to cancer problem supp 11 308

Endometrium Endometrial growth in right ilium in just with a view of the origin of this type of tumor 63

Variations in the prognosis of endometrial carcinoma as indicated by histological structure 64

- Endotherm knife Newer developments of electrothermic methods in treatment of neoplasms 93
- England Cancer education in supp 11 Mortality from cancer among people of different races supp 11 247
- Entero-anastomosis Technique of a new and strictly aseptic method of 378
- Intoxia Bradytoxia a study based on five hundred cases in the Chicago lying in hospital 194 11 281
- Epididymis Torsion of spermatic cord report of fifteen cases 311
- Ethmoid sinus Experiences with orbito-ethmoidal osteomata having intracranial complications 721
- Ethylene-oxygen anesthesia report of 2750 cases 690
- Ewing's sarcoma Bone Sarcoma supp 1 126
- Extraperitoneal sarcoma Bone Sarcoma supp 1 169
- Eye Radium therapy in some ocular conditions or Experiences with orbito-ethmoidal osteomata having intracranial complications with report of four cases 21 Conditions of eyeball arising from rhinopharyngeal disease 5 Unilateral atrophic optic neuritis 84
- FALLOPIAN** tubes Studies in sterility in women 520 Utilization of round ligaments in tubal sterilization 9
- Fatty tissue Malignant tumors of 232
- Femur Treatment of fracture of neck of 50 Shortening of bones of leg to correct inequality of length 93
- Fibromyxosarcoma of stomach in case of neurofibromatosis 305
- Fibula Fracture of tibia and 115 Shortening of bones of leg to correct inequality of length 93
- Fingers Surgery of nerves of hand 145 Splint for overcoming contracture of 405
- Finsen Medical Institute supp 11 7
- Finsen Reyn's lamps Heliotherapy in surgical tuberculosis 741
- Fistula Use of iodine oil in the demonstration of empyema cavities and fistulous tracts 11
- Foot Tendon transplantation 455
- Forceps delivery 221
- Foreign bodies Bronchoscopy and esophagoscopy a brief consideration of technique 95
- Fractures Treatment of of neck of femur 529 Technique of open reduction of 541
- France Organized movement against cancer in France supp 11 31 Organization and practical working of centers against cancer in France supp 11 39 Mortality from cancer among people of different races supp 11 3
- Fracture Importance of early assumption of function in reconstruction surgery 95
- Frozen section Tissue diagnosis in operating room and immediate cover slip examinations of all fluids and pus 818
- Function Assumption of Importance of early in reconstruction surgery ed 708
- GALL** bladder Experimental study of lymphatic theory of pancreatitis 15 Cholecystectomy 85 Present status of cholecystography and remarks on mechanism of emptying of gall bladder 153 Internal drainage of gall bladder as a routine operative procedure report of one hundred cases 193 End results of cholecystectomy as shown by cholecystogram 463 Reduction in vital capacity following operation 483 Experimental study of operation of cholecystenterostomy 61 Grades of malignancy in primary carcinoma of 756
- Cangrene Treatment of annular of small bowel by intubation versus resection 374
- Gassman ganglion Tumors of with report of two cases of extracranial carcinoma infiltrating ganglion by direct extension through maxillary division 202
- Gastrectomy Partial 215 Treatment of chronic duodenal ulcer moderation in all things ed 269 Relation of postoperative achlorhydria to cure of gastric and duodenal ulcers 344 Technique of partial gastrectomy for cancer of stomach 659
- Gastrius Phlegmonous gastritis an anatomical and clinical study of two cases 301
- Castro-enterostomy Treatment of chronic duodenal ulcer moderation in all things ed 269 Relation of postoperative achlorhydria to cure of gastric and duodenal ulcers 344 Technique of a new and strictly aseptic method of entero-anastomosis 378
- Castro-intestinal tract Technique of the surgery of 811 Method for gastro-enterostomy with a transverse jejunal incision an experimental study 824
- Castrojejunostomy Technique of a new and strictly aseptic method of 378
- General practitioner Relation of to cancer problem supp 11 308
- Genito-urinary tract Clinical importance of Buck's and Colles' fasciae 208 Use of seton in repair of torn or strictured urethra new method 247
- Germany Organized movement for cancer control in supp 11 93 Work of diagnosing and treating cancer in North Germany supp 11 241 Mortality from cancer among people of different races supp 11 247
- Giant cell tumors of bone Bone Sarcoma supp 1 172
- Gout Primary thyroidectomy for exophthalmic with report of one hundred twenty cases 406 Effects of thyroidectomy and thyroid feeding on cardiac output 617 Latent postoperative tetany 617
- Gross Samuel W. 842
- Gynaecomastia swellings of male breast 30
- ETHYLENE-OXYGEN** anesthesia report of 2750 cases 690
- Hand Surgery of nerve of 145 Splint for overcoming contractures of fingers 404
- Head Recto-abdominal maneuver for determining engagement of fetal 563
- Heart Cardiomyopathy for mediastinopericarditis with case report 113 Reduction in vital capacity following operation 483 Effects of thyroidectomy and thyroid feeding on cardiac output study of regulation on cardiac output 617
- Heel Avulsion of 833
- Heliotherapy Sunlight and ultraviolet radiation ed 126 in surgical tuberculosis 743
- Heredity Relation of general practitioner to cancer problem supp 11 305
- Hernia Modified technique for difficult inguinal 261 Protrusion of urethra in female children 400 Reduction in vital capacity following operation 483 Traumatic rupture of the diaphragm report of case with recovery following operation 684
- Hip Heliotherapy in surgical tuberculosis 743
- Histology Cancer problem ed 340
- Hol and Mortality from cancer among people of different races supp 11 247
- Horseshoe Effect of sterilization on 411
- Hydatid cysts of liver with report of sixty three previously unpublished cases 577
- Hypertension 190
- Hypertrophism 190
- Hysterectomy Total or subtotal for fibroids ed 569

- ICTERUS** Pathogenesis of jaundice 49
 Ileostomostomy Technique of a new and strictly aseptic method of entero-anastomosis 38
Ileus Paralytic Caecostomy for following catapapentoneal operations ed 271
 Imperial Cancer Research Fund Cancer education in England supp 11 22
 Index to Volumes I to XL ed 415
 Infectious theory of cancer How we should regard the new theories of the origin of cancer supp 11 25
 Instruments New developments of electrothermic methods in the treatment of neoplasms 95 Electrocoagulation snares for tonsil and intranasal surgery and for benign or malignant growths 123 New method of obtaining costal cartilage for plastic and reconstruction surgery 637 New apparatus for transfusion of untreated blood 263 Technique of a new and strictly aseptic method of entero-anastomosis 38 Sphincter overcoming contractures of fin. ers 404 Treatment of fracture of neck of femur 529 Heliotherapy in surgical tuberculosis 43
Insulin Case illustrating dangers of promiscuous use of tr 131 Hyperinsulinism 190 Preparation and management of surgical diabetic 253
 Intestinal anastomosis technique of the surgery of the gastro-intestinal tract 811
Intestines Use of iodized oil in demonstration of empyema cavities and fistulous tracts 11 Use operative and postoperative treatment in patients with gastric and duodenal lesions 74 Technique of colon resection 90 Volvulus of sigmoid flexure 10 Malignant tumors of fatty tissues 232 Treatment of chronic duodenal ulcer moderation in all things ed 269 In oluntary nervous system in relation to abdominal disease 259 Relation of postoperative achylia to cure of gastric and duodenal ulcers 344 Incidence of carcinoma of uterus among Jewish women 355 Treatment of annular gangrene of the small bowel by invagination versus resection 34 Technique of new and strictly aseptic method of entero-anastomosis 378 Enteromelic cysts 405 Carcinoma of the rectum and rectosigmoid factors influencing the choice of operative technique 556 Enterovesical fistula 753 Technique of surgery of the gastro-intestinal tract 811 Method for gastro-enterostomy with a transverse jejunal incision an experimental study 824 Intestines Use of mercurochrome 20 soluble in peritoneal and other cavities for sep 11 336 Evidence of value of education in control of cancer supp 11 155 Prevention of cancer supp 1 165
 Iodized oil Use of iodized oil in the demonstration of empyema cavities and fistulous tracts 11
Italian League for the Control of Cancer Movement in Italy for control of cancer supp 11 87
Italy Mortality from cancer among people of different races supp 11 247
J **JAUNDICE** Pathogenesis of 49
 Jaw Adamantine epithelioma 173
Jejunum Technique of a new and strictly aseptic method of entero-anastomosis 38 Method for gastro-enterostomy with a transverse jejunal incision 824
Jewish women Incidence of carcinoma of uterus 355
K **KIDNEY** Use of iodized oil in demonstration of empyema cavities and fistulous tracts 11 Ureteral stricture in male and female 43 Benign adenoma of kidney 169 Radiographic simulation of renal calculi by papillomata of the skin report of two cases 30 Malignant tumors of fatty tissues 232 Pyonephrosis of right kidney bifurcated ureter tr 80 Nephro-lithiasis a clinical study of seventy-one cases 327 Ureteropyelography 433 Pyelovenous backflow at time of pyelography 592 Hemorrhagic cysts of 601
 Knee joint Danger of incomplete removal of small and apparently innocent lesions cor 413
 Kocher abdominal fixation for certain types of prolapse of uterus ed 839
 Kraske operation Balkan frame and its use in general surgery 831
L **LABIUM** majus Fodometri growth in n. lit 637
 Labor Placenta previa study of one hundred sixty five cases 39 Forceps delivery 221 Breech delivery study of five hundred cases in China 6 Lyons In Hosp 11 194 tr 281 Recto-abdominal maneuver for determining engageability of fetal head 563
 Laboratory technician Tissue diagnosis in operating room and immediate cover slip examination of all fluids and pus 838
 Lead colloid treatment of cancer Professor W. Blair Bell a method of treating cancer supp 11 318
 League against cancer The organized movement against cancer in France supp 11 31
 Leg Fracture of the tibia and fibula 115 Tendon transplantation 45 Treatment of fracture of neck of femur 529 Shortening of bones of to correct inequality of length 703 Baseball cover flaps in leg and thigh amputations 810
 Ligament Clinical importance of Buck's and Colles fasciae 208 Endometrial growth in right labium majus 637
 Light Biological action of ed 567
 Lipiodol Value in diagnosis and treatment of abscess of lung 1 Use of iodized oil in demonstration of empyema cavities and fistulous tracts 11 Present status of cholecystography and remarks on mechanism of emptying of gall bladder 153
 Lipoma Malignant tumors of fatty tissues 232
 Liposarcoma Malignant tumors of fatty tissues 23
 Lister Lord Surgery and the international part 4 6 4 8
 Littre gland of Clinical importance of Buck's and Colles fasciae 208
 Liver An experimental study of lymphatic theory of p. n. creatitis 15 Pathogenesis of jaundice 49 Hydrotic cysts of with report of sixty three previously unpublished cases 577
 Louvain Cancer Institute The Anti-cancer campaign in Belgium supp 1 63
 Lugol's solution Primary thyroidectomy for exophthalmic goiter with a report of one hundred twenty cases 406
 Luncheon Value of lipiodol in diagnosis and treatment of abscess of 1. Experimental studies in pulmonary suppuration 38 Use of iodized oil in demonstration of empyema cavities and fistulous tracts 11 Reduction in vital capacity following operation 443 Use of mercurochrome 20 soluble in peritoneal and other cavities for sepsis 336
 Lymphatic vessels Experimental study of the lymphatic theory of pancreatitis 5
 Lymph nodes Lymphatic involvement in cases of carcinoma of the pyloric end of the stomach 6
M **MALIGNANCY** Danger of incomplete removal of small and apparently innocent lesions cor 43 Complete operation in treatment of neoplastic disease ed 46
 Mammary gland Swellings of the male breast 30
 Master Surgeon 4—William Louis Rodman, 13 Jonathan
 Mason Warren 21 Lewis Atterbury Nimmo 51
 William Worrell Mayo 10 Samuel W. Gross 94

- Mayo William Worrell 710
 Mayo Clinic Cancer of the stomach supp 11 103
 Mediastinopericarditis Cardiomyolysis for case report 113
 Medical education Boards on medical motion picture films and traumatic surgery ed 123
 Memoirs I Wyllis Andrews 418
 Menstruation Hysterectomy of the fundus 803
 Mercurochrome 2 o soluble Use of in peritoneal and other cavities for sepsis 836
 Morbidity Cancer Statistics of anti cancer center at Geneva Switzerland supp 11 66
 Mortality Prevalence of cancer as revealed by mortality returns and at autopsy supp 11 21, from cancer among people of different races supp 11 247 Chance of death from cancer supp 11 274
 Motion pictures Board on medical and traumatic surgery ed 123
 Mouth Value of education in control of cancer supp 11 155
 Myeloma Bone Sarcoma supp 11 155
- NASOPHARYNX** Tumors of gasserian ganglion with report of two cases of extracranial carcinoma infiltrating the ganglion by direct extension through maxillary division 20
- Nau ea Ethylene oxygen anesthesia a report of 50 cases 690
- Neck Details in repair of cicatricial contractures 306
 Neoplastic disease Co-operation in treatment of neoplastic disease 410
 Neoprectomy Benign adenoma of the kidney report of a case 169 Hemorrhagic cysts of the kidney 601
 Nephrolithiasis a clinical study of seventy-one cases 31
 Nerves Surgery of of hand 145 Tumors of gasserian ganglion with report of two cases of extracranial carcinoma infiltrating ganglion by direct extension through the maxillary division 202 Involuntary nervous system in relation to abdominal disease 249 fibromyxosarcoma of stomach in case of neurofibromatosis (von Recklinghausen's disease) 108 Splanchnic anesthesia or (conditions of eyeball arising from rhinopharyngeal disease 7 Unilateral atrophic optic neuritis 74 Importance of early a sumpion of function in reconstructive surgery 08
- Nervous system Tumors of the gasserian ganglion with report of two cases of extracranial carcinoma infiltrating ganglion by direct extension through the maxillary division 20 Involuntary nervous system in relation to abdominal disease 289 Splanchnic anesthesia 501 Chronic rhinopharyngeal disease 66
- Netherlands Mortality from cancer among people of different races supp 11 247
- Neuralgia Tumors of gasserian ganglion with report of two cases of extracranial carcinoma infiltrating ganglion by direct extension through the maxillary division 202
- Neurofibromatosis Fibromyxosarcoma of stomach in case of (von Recklinghausen's disease) 108
- New England Peribody Home for Crippled Children Heliotherapy in surgical tuberculosis 743
 Newspaper publicity in the control of cancer supp 11 299 Relation of the general practitioner to the cancer problem supp 11 308
- Nose Electrocoagulation snare for tonsil and intranasal surgery and for benign or malignant growths 123 New method of obtaining costal cartilage for plastic and reconstruction surgery 687 Experiences with orbito-ethmoidal osteomata having intracranial complication with report of four cases 721 Chronic rhinopharyngeal disease 66 Conditions of the eyeball arising from rhinopharyngeal disease 775

- OBSTETRICS** Pecto-abdominal maneuver for determining engageability of fetal head 563
 Oesophagus Prevention of cancer supp 11 165
 Oesophagus copy Bronchoscopy and a brief consideration of technique 0
 Olfact Transvers grafts Transplantation of skin 181
 Old Masterpieces in Surgery—The Surgeons Directorate of Thomas Vicary 133 The Abstract of sea surgery by John Moyle 284 (Girolamo Mercuriale (Hieronymus Mercurialis) 420 The Medical Dictionary of Hieronymus Stephanus 574 Concerning Fracture of the Skull by Jacob Berengarius of Cremona 717 The Cure of Gun shot wound by Leonardo Botallio 844
- Orbit Experiences with orbito-ethmoidal osteomata having intracranial complication with report of four cases 721
- Orchopathy Undescended testicle with special reference to Totel's method of orchopexy 53
- Orchidectomy Torsion of the spermatic cord 311
- Os calcis Avulsion of the heel 813
- Ossler Sir William Surgery and the international spirit 427
- Osteogenic sarcoma Bone anoma supp 11 26
- Ovary Bell Beutner operation with ovarian conservation or graffian corpus 138 Studies in sterility in women 50 Hysterectomy of fundus 803
- PANCREAS** Experimental study of lymphatic theory of pancreatitis 15
 Pancreatic duct Duodenal fistula effect of loss of gastric duodenal pancreatic and biliary secretions from body ed 40
 Pancreatitis Lymphatic theory of 15
 Paralysis Obstetrical 547
 Pasteur Surgery and the international spirit 428
 Pathologists Value of co-ordinated effort among surgeons pathologists and others in control of cancer supp 11 1 Clinical value of certain phases of cancer research supp 11 201
- Pelvis Clinical importance of Buck and Colles fasciae 208
 Peptic ulcer Partial gastrectomy 215
 Pericarditis Cardiomyolysis for mediastinopericarditis 113
 Peritonitis Use of mercurochrome 2 o soluble in peritoneal and other cavities for sepsis 836
- Pharynx Preliminary paper on improvement of speech in cleft palate cases 44 Chronic rhinopharyngeal disease 66 Conditions of eyeball arising from rhinopharyngeal disease 7
- Placenta Specimen of from tet of triplets tr 130 Premature separation of placenta praevia marginalis tr 250 with many infarcts tr 281
- Placenta praevia Study of one hundred and sixty five cases 39
- Polya operation on technique of partial gastrectomy for cancer of stomach 639
- Porter operation Caesarean section followed by temporary extirpation of uterus 789
- Portraits—1 Odman William Louis opp 128 Jonathan Mason Warren opp 273 E Wyllis Andrews opp 418 Lewis Atterbury Stimson opp 571 William Worrell Mayo opp 10 Samuel W Gross opp 842
- Pott's disease Operative plating of the vertebral column in 668
- Pregnancy Two cases of in a bicornuate uterus tr 130 Case illustrating dangers of promiscuous use of salicin tr 131 Combined intra uterine and extra uterine pregnancy cor 414 Use of mercurochrome 2 o soluble in peritoneal and other cavities for sepsis 836
- Prolapse of uterus New method of correcting complete inversion of the vagina with or without complete prolapse report of two cases 550

- Trophylaxis The work of diagnosing and treating cancer in North Germany, supp 11 141
- Irostate True prostatic calculi clinical data based on seventy six cases 163
- Prostatectomy New technique for perineal prostatectomy with preservation of external sphincter 612
- Irostatitis True prostatic calculi clinical data based on seventy six cases 163
- Pterygium Radium therapy in some ocular conditions 701
- Pyelography I benign adenoma of kidney report of case 169 Ureteropyelography 433 Pyelocystic backflow at time of 591
- Pyonephrosis of right kidney bifurcated ureter tr 250
- R**ACIAL pericarditis of cancer supp 11 195
- Radium Biologic principles in treatment of uterine myomas 363 Untreated cancer of breast 264 cor 414 Co-operation in treatment of n. oplastic disease ed 416 Adjuvant therapy in some ocular conditions 701 Radiological treatment of cancer supp 11 103 What is value and what should be organization and equipment of institutions for treatment of cancer by Radium and X rays supp 11 116 Work of diagnosis and treating cancer in North Germany supp 11 241 Clinical value of certain phases of cancer research supp 11 201 Cancer as a specialty supp 11 251
- Radium Institute of Paris The organized movement against cancer in France supp 11 31
- Recklinghausen's (von) disease Fibromyxosarcoma of stomach in case of neurofibromatosis 308
- Reconstruction surgery New method of obtaining costal cartilage for plastic and 61 Importance of early assumption of function in 705
- Rhynchel New method of correcting complete inversion of vagina with or without complete prolapse report of two cases 550
- Pectum Use of iodized oil in demonstration of empyema cavity and fistulous tracts 11 Operation for rectovaginal fistula complicated by the degree tear 105 Sigmoidectomy after radical operations for rectal cancer 25 Sarcoma of rectum of case with review of literature 48 Carcinoma of rectum and rectosigmoid factors influencing choice of operative technique 536 Balkan frame and its use in general surgery 811 Prevention of cancer supp 11 165
- Renal calculi Radiographic simulation of renal calculi by papillomata of skin report of two cases 230
- Research Practical value of into causes of cancer supp 11 208 Clinical value of certain phases of cancer supp 11 201
- Respiratory tract Reduction in vital capacity following operation 43
- Rhinoplasty New method of obtaining costal cartilage for plastic and reconstruction surgery 687
- Ricket Charles Surgery and international print 427
- Rodrick Sir Thomas Surgery and international print 426
- Rodman William Louis 15
- Roentgenography Present status of cholecystography 153 Benign adenoma of kidney report of a case 160 Radiographic simulation of renal calculi by papillomata of skin report of two cases 230 Ureteropyelography 433 Pyelocystic backflow at time of pyelography 591
- Roentgen ray Value of lipiodol in diagnosis and treatment of abscess of lung 1 Use of iodized oil in demonstration of empyema cavities and fistulous tracts 11 Radiograph simulation of renal calculi by papillomata of skin report of two cases 230 Biologic principles in treatment of uterine myomas 363 Untreated cancer of breast 264 cor 414 Co-operation in treatment of n. oplastic disease ed 416 Radiological treatment of cancer supp 11 103 What is value and what should be the organization and equipment of institutions for treatment of cancer by Radium and X ray supp 116 Work of diagnosis and treating cancer in North Germany 11 31 Clinical value of certain phases of cancer research ed supp 201 Practical value of research into causes of cancer supp 11 208 Cancer as a specialty supp 11 251
- Round ligaments Utilization of in tubal sterilization 829
- Rub in test Studies in sterility in women 520
- S**ALPINGITIS Use of mercurochrome 220 soluble in pentonol and other cavity for sepsis 816
- Sarcoma Danger of incomplete removal of small and apparently innocent lesions cor 413 of rectum report of case and review of literature 478 of bone see supp 1 Value of education in control of cancer supp 11 155 Sense of smell Value to surgeon of ed 707
- Seton Use of in repair of a torn or strictured urethra new method with report of two cases 247
- Shock Compression of duodenum by mesentery and superior mesenteric vessels an underlying cause of acute gastric dilatation 359 Reduction in vital capacity following operation 43
- Shoulder Recurrent anterior dislocation at operation ed by bone graft 265 Obstetrical paralysis 547
- Sigmoid Volvulus of sigmoid flexure 101 Sigmoidostomy after radical operation for rectal cancer 225 Carcinoma of rectum and rectosigmoid factors influencing the choice of operative technique 556 Sigmoidostomy after radical operations for rectal cancer 25
- Skin Transplantation of 18 Radiographic simulation of renal calculi by papillomata of report of two cases 230 Evidence of value of edication in control of cancer supp 11 155
- Skin flap Transplantation of skin 181
- Skin graft Transplantation of skin 181 full thickness and pedicled Some details to repair of cicatricial contractions of neck 305
- Skull Tumors of gasserian ganglion with report of two cases of extra cranial carcinoma infiltrating the ganglion by direct extension through maxillary division 6
- Small Value to surgeon of sense of ed 707
- Speech Impairment of in cleft palate cases 244
- Spermicoid Torsion of report of fifteen cases 311
- Sphincter A New technique for perineal prostatectomy with preservation of external 61
- Spleen Operation of splinting of vertebral column in Pott's disease 603 Heliotherapy in surgical tuberculosis 43
- Splints for removal of contractions of fingers 404
- Spondylitis Operation planting of vertebral column in Pott's disease 603
- Statistical Value of co-ordinated effort among surgeons pathologists and others in control of cancer supp 117 The absence of cancer as reflected by mortality returns and at autopsy supp 11 217
- Sterility Studies in women 520
- Sterilization Effect of on horsehair 41 Use of round ligaments in tubal 829
- Stomach Lea Anthrax 51
- Stomach Use of iodized oil in demonstration of empyema cavities and fistulous tracts 11 Preoperative and postoperative treatment in patients with gastric and duodenal ulcers 4 Partial gastrectomy 215 Treatment of chronic duodenal ulcer moderate in all forms ed 269 In voluntary nervous system and relation to abdominal disease 289 Phlegmonous gastritis

tis anatomical and clinical study of two cases 301
 Fibromyxosarcoma of in a case of neurofibromatosis
 (von Recklinghausen's disease) 308 Relation of post
 operative achlorhydria to cure of gastric and duodenal
 ulcers 144 Incidence of carcinoma of uterus among
 Jewish women 355 Compression of duodenum by
 mesentery and the superior mesenteric vessel under
 lying cause of acute gastric dilatation 359 Effect of
 acute perforation on course of peptic ulcer 390
 Technique of partial gastrectomy for cancer of stom
 ach 459 Lymphatic involvement in cases of car
 cinoma of pyloric end of stomach 61 Technique of
 surgery of the gastro-intestinal tract 811 Method for
 gastro-enterostomy with a transverse jejunal incision
 experimental study 824 Duodenal fistula effect of
 loss of gastric duodenal pancreatic and biliary secre
 tions from body ed 840 Cancer of supp u 103
 Evidence of value of education in control of cancer
 supp u 15 Prevention of supp u 165
 Stumps Surgery of nerves of the hand 145
 Sunlight and ultraviolet radiation ed 126
 Sunshine Biological action of light ed 567
 Surgeon Value to of sense of smell ed 7 Value of
 co-ordinated effort among surgeons pathologist and
 others in the control of cancer supp u 17
 Surgery and the international spirit 424
 Suture Living tendon in appendiceal technique 117
 Sweden Mortality from cancer supp u 247
 Switzerland Campaign against cancer in supp u 60
 Morbidity statistics of anti cancer center at Geneva
 suppl u 66 Mortality from cancer supp u 247
T
 TALIPUS equinus alcanicus varus valus Tendon
 tran plantation 455
 Tendon Li in tendon suture in appendiceal technique
 11 tran plantation 455 Importance of early
 a summption of function in reconstruction surgery 08
 Testicle Undescended with special reference to Fother
 s method of orchopexy 53 Torsion of the spermatic
 cord report of fifteen cases 311
 Tetany Latent postoperative 5
 Tetanic Baseball cover flaps in leg amputations 810
 Thyroidectomy Effects of and thyroid feeding on the
 cardiac output 617 Latent postoperative tetany 62
 Thyroid gland Acute thyroiditis 21 Primary thyroid
 ectomy for exophthalmic goiter with report of one
 hundred and twenty cases 406 Effect of thyroidec
 tomy and thyroid feeding on cardiac output 61
 Latent postoperative tetany 617
 Thyroiditis Acute 5
 Tibia Fracture of and tibia 115 Shortening of bones of
 leg to correct inequality of length 03
 Tissue air noxis in the operating room and immediate
 cover lip examinations of all fluids and gases 838 and
 racial peculiarities of cancer supp u 105
 Tonsil Electrocoagulation nares for tonsil and intranasal
 surgery and for benign or malignant growths 123
 Torek's method Undescended testicle with special refer
 ence to 53
 Toulouse Center for Control of Cancer Need of special
 institutions for investigation and treatment of cancer
 etc supp u 47
 Trachea Reconstruction of 119
 Transfusion New apparatus for transfusion of untreated
 blood 262
 Traumatic surgery Board on medical malpractice 125
 Triplets Specimen of placenta from set of 1 130
 Tuberculosis Experimental studies in pulmonary suppura

tion 328 Heliotherapy in surgical 743 Intravesical
 fistula 753 Cancer education in England supp u
 11 Chance of death from cancer supp u 14
 Tullier Surgery and the international spirit 430

U
 ULCER Effect of acute perforation on course of peptic
 390
 Ultraviolet ray Sunlight and ed 126 Biological action of
 light ed 567
 Ureter Ureteral structure in male and female with particu
 lar reference to symptoms and diagnosis 43 Lypo
 nephrosis of right kidney bifurcated ureter tr 280
 Ureteropyelography 433 Pyelovenous backflow at
 time of pyelography 502
 Urethra Clinical importance of Puck's and Colles' fasciae
 208 Use of seton in repair of a torn or strictured
 urethra a new method with report of two cases 247
 Operation for traumatic rupture of in male 372
 Prolapse of in female children 400 Use of mercurio
 chrome 30 Soluble in peritoneal and other cavities
 for sepsis 836
 Ureteropyelography 433
 Urinary tract Ureteral stricture in male and female with
 particular reference to symptoms and diagnosis 43
 Urobilin Athogenesis of jaundice 480
 Uterography Biological principles in treatment of uterine
 myoma 365
 Uterus Two cases of pregnancy in bicornuate uterus tr
 130 Infarcts with many infarcts tr 281 Incidence of
 carcinoma of among Jewish women 355 Biological
 principles in treatment of uterine myoma 365
 Danger of incomplete removal of small and apparently
 innocent lesions cor 413 Studies in sterility in
 women 50 New method of correcting complete
 inversion of vagina with or without complete pro
 lapse report of two cases 550 Total or subtotal
 hysterectomy for fibroid ed 569 An endometrial
 growth in tight labium majus with discussion of
 origin of this type of tumor 637 Variations in the
 prognosis of endometrial carcinoma as indicated by
 histological structure 646 Cesarean section followed
 by temporary exteriorization of uterus the Portes
 operation 783 Hysterectomy of fundus 803 Other
 abdominal fixation for certain types of prolapse of
 uterus ed 339 Evidence of value of education in con
 trol of cancer supp u 155 Prevention of cancer
 supp u 15

V
 VAGINA Operation for rectovaginal fistula complicated
 by third degree tear 105 Baldwin operation for
 formation of an artificial vagina report of six cases
 530 New method of correcting complete inversion of
 vagina with or without complete prolapse report of
 two cases 550
 Vertebra Operative splinting of the vertebral column in
 Pott's disease ed 665 Heliotherapy in surgical tubercu
 losis 743
 Vital capacity Reduction in following operation 483
 Voice Preliminary paper on improvement of speech in cleft
 palate cases 244
 Volvulus of stomach and intestine 107
 Vomiting Ethylene-oxygen anaesthesia report of 250
 cases 690

WARREN JOHN JONATHAN MASON 273

X RAY—See Roentgen ray

BOOK REVIEWS

- BARTLETT WILLARD A.B. AM. MD. DSC. FACS
The Surgical Treatment of Goiter. To sword by
Charles Mayo 286
- BÉRAUD L. and SURGON A. Cancer de l'Œsophage 575
- BLUMBERG JOHN. Lehrbuch der topographischen Ana-
tomie mit besonderer Berücksichtigung ihrer anwa-
dungs 285
- BOLTON ALICE W. BA. M.B. B.Ch. (Camb.) FRCS
(Eng.) Recent Advances in Obstetrics and Gynecol-
ogy 137
- BRECHMAN LIEBT. COLONEL ANDREW. IMS Midwifery
Mechanics 136
- CATHCART GEORGE C. M.A. MD. The Treatment of
Chronic Deafness by the Electrophonetic Method of
Zünd Burguet 718
- CHAPIN W. A. R. MD. The Lost Legion. The Story of
the Fifteen Hundred American Doctors who Served
with the B. F. F. in the Great War 422
- COCHRANE W. A. M.B. Ch.B. FRCS. Orthopaedic
Surgery 2
- COVENTRE J. J. M.C. MD. (Oxon.) FRCP (Lond.)
Self Care for the Diabetic for the Use of Diabetic
Patients 316
- DAS KEDARNATH CIE. MD. A Textbook of Midwifery
for Medical Schools and Colleges in India. 2d ed. 136
- DE LINT J. G. Atlas of the History of Medicine. I. Anat-
omy. With To sword by Charles S. Sager 576
- DORLAND W. A. M.D. FACS and HUBERT
MAXIMILIAN J. M.D. FACS. The
A Ray in Embryology and Obstetrics 37
- EDEN THOMAS WATTS. MD. CM. (Edin.) I.RCS
(Edin.) FRCP (Lond.) Major R.A.M.C. and
HOLLAND EARLEY. MD. BS (Lond.) FRCP
(Lond.) I.RCS (Eng.) A Textbook of Obstetrics
6th ed. 136
- EINHORN MAX. MD. The Duodenal Tube and Its Pos-
sibilities. 2d ed. 286
- FINCH CULRO. Brain and Heart. Lectures in Physiol-
ogy. Translated by Helen Ingleby. Foreword by Prof. L.
H. Starling. C.M.G. MD. D.Sc. FRS 719
- FITZWILLIAMS DUNCAN C. L. CMG. MD. ChM. FR-
CS (Edin. and F.R.C.) On the Breast 137
- FRANK KARL. Gynäkologische Operationen 134
- FRASER JOHN. M.C. MD. Ch.M. I.R.C.S.E. Surgery
of Childhood. Vols. 1 and II 720
- GRAHAM GEORGE M.A. MD. FRCP. The Pathology
and Treatment of Diabetes Mellitus. 2d ed. 422
- HALBIN JOSEF and SETZ LUDWIG. Biologie und Pathol-
ogie des Weibes. ein Handbuch der Frauenheilkunde
und Geburtshilfe 135
- HARTMANN HENRI. Chirurgie de l'estomac. (Première
Partie) 575
- HOLLENDER ABRAHAM R. MD. and COFFEE, MAURICE
H. MD. Physical Therapy in Diseases of the Eye,
Ear, Nose, and Throat with chapters on some of the
line affections 56
- HOVELACQUE A. Anatomie des Nerfs Craniens et Ra-
chidiens et du Système Grava Sympathique chez
l'Homme. Vols. 1 and II 422
- JACKSON ARNOLD S. MD. Goiter and other Diseases of
the Thyroid Gland, 422
- JORDAN HARVEY LESTER. AM. PH.D. and KIRKEND
J. E. M.A. PH.D. A Textbook of Embryology 56
- KARSTEN HOWARD T. MD. Human Pathology. A Text-
book. Introduction by Simon Flexner MD 422
- KENNEDY JAMES WILLIAM. MD. FACS. Practical
Surgery of the Joseph Price Hospital 237
- KNAGGS R. LANTFORD. M.C. (CANTAB.) FRCS. The
Inflammatory and Toxic Diseases of Bones 285
- LECLERC P. and LERACHE I. Thérapeutique Chirurgicale
Vols. 1 and II 423
- LIEPMANN PROF. DR. WILHELM. Clinica Obstet. 4th
ed. Translated from the German by D. Victor Con-
ly Montebello 545
- LIEPMANN PROF. DR. W. De Abtreibung. Eine mediz-
nisch soziologische Studie in bildl. chen Darstellungen
suer letzte Juristen und Soziologen 546
- LOWESLEY OSWALD VINCEY. AB. MD. I.RCS. and
KIRWIN THOMAS JOSEPH. PHC. BS. M.A. MD.
5
- MACKENZIE, SIR JAMES. MD. FRS. FRCP. I.L.D.
AB. and EF. FRCP (Edin.) and ORR JAMES
M.B. Ch.B. Principles of Diagnosis and Treatment
in Heart Affections. 3d ed. 719
- MAX HALL, F. H. A. FRS. An Introduction to S. u. l
Physiology for Biological, Medical and Agricultural
Students 137
- MORGAN J. DOUGLASS. BA. MD. Electrothermic
Methods (Dissection and Coagulation) and the Treat-
ment of Neoplastic Diseases. Designed as a Practical
Handbook of Surgical Electrotherapy for the Use of
Practitioners and Students 421
- Ophthalmic Year Book. Vol. XXII. Containing bibli-
ographies, digests and I deses of the literature of
ophthalmology for the year 1925. Edited by WILLIAM
H. CRISP with the collaboration of others 422
- PANNETT CHARLES A. B.Sc. MD. (Lond.) FRCS
(Eng.) Surgery of Gastrointestinal Ulceration 6
- PARAMORE R. H. M.P. (Lond.) FRCS (Eng.)
The Status of the female Pelvis in Viscera, 36
- PALCHET VICTOR. La Fraque Chirurgicale Illustrée
Vol. 2 575
- POLITZER LOUIS. Textbook of the Diseases of the Ea-
for students and practitioners. Revised and largely
rewritten by VICTOR J. BALLIN. MD. Ph.D. 6th ed.
421
- RYALL J. CANNY. FRCS. Operative Cystoscopy 134
- SAMPSON C. M. MD. A Practice of Physiology. 80
- SCUDDER CHARLES LOCKE. AB. PH.D. MD. FACS
The Treatment of Fractures with Notes upon a Few
Common Dislocations. 10th ed. rev. 286
- STOKES JOHN H. MD. Modern Clinical Syphology
Diagnosis Treatment Case Studies. Written with the
co-operation of PAUL A. O'LEARY. MD. WILLIAM H.
COOPERMAN. M.D. LOREN W. SHIFFER. MD. and
CLEVELAND J. WHITE. MD. 78
- TOLST CARL. MD. An Atlas of Human Anatomy for
Students and Physicians. Assisted by PROF. ALDO
ITALIA ROSA. MD. Adapted to English and Ameri-
can and International Terminology by M. EDEN. PAUL
MD. (Brux.) M.R.C.S. L.R.C.P. 421
- WIGGIES H. and DAUPHIN J. L'Année Obétricale 1924
346
- WYTHE GEORGE A. MD. Surgery of Neoplastic Diseases
by Electrothermic Methods. Preface by HOWARD A.
KELLY. MD. 285
- ZANGEMEISTER PROF. DR. WILHELM. Lehrbuch der
Geburtshilfe 846
- ZWEIFEL, P. and LAYR E. Die Kl. d. u. d. Geschwulst. Vol. 1, 2, 3, 4, 5

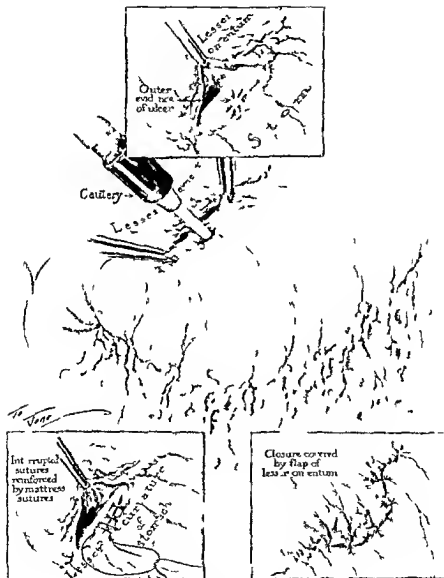
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NUMBER 1

THE VALUE OF LIPIODOL IN THE DIAGNOSIS AND TREATMENT OF ABSCESS OF THE LUNG

By HARRY C. BALLON, M.D. MONTREAL, QUEBEC

A VERY extensive literature on abscess of the lung including accurate descriptions of the clinical picture as well as the various methods for the experimental production of this form of lung suppuration already exists. Since the introduction of pneumonographic methods by Jackson (5) and Lynch (6) and particularly with the injection of lipiodol as carried out by Sicard and Forestier (7) David H. Ballon (2) and others a definite attempt at a better understanding of the underlying lesions of the various lung suppurations has been made. The result has been that our views on the diagnosis and treatment of abscess of the lung have been somewhat altered. We feel that the value of lipiodol lies in the fact that it affords in most cases a means of demonstrating the extent of the underlying pathological process of estimating the response to treatment and of observing whether the treatment has completely accomplished its task.

In the records of the Surgical Service of the Royal Victoria Hospital for the past 16 years there were 94 cases of abscess of the lung. It is my purpose to summarize these records briefly in order to present these experiences. Many of the details have received but scant attention, an attempt being made rather to explain past errors in the diagnosis and treatment on the basis of information obtained from a routine examination, which included

preliminary and postoperative injection with lipiodol.

The youngest age recorded among females in this series was 1 year while in the males it was 2 years, the latter being a true post-pneumonic abscess of the lung (Table I). It

TABLE I—AGE INCIDENCE, SEX, AND MORTALITY—94 CASES

Age	Females	Deaths Females	Males	Deaths Males
Under 5	2	1	2	
5 to 10	1		1	
10 to 20	2		7	1
20 to 30	13	2	10	1
30 to 40	7	4	20	9
40 to 50	4	1	11	2
50 to 60			9	2
60 to 70	1		2	2
No record of age	2	1		
Total	32	9	62	17

is interesting to note that the degree of severity and number of cases recorded did not seem to be influenced by the virulence of the respiratory infection during influenza epidemics.

With regard to predisposing factors and etiology nothing more than a classification of the apparent direct cause has been made (Table II).

Of the 94 cases here recorded a relatively high percentage (25 per cent) occurred in patients who had operations about the mouth and throat. In this connection it is important to appreciate that the occurrence of a febrile disease with cough and fetid expectoration fol-



Fig. 1. Case 1. Bronchiectasis in the right middle and lower lobes in a female aged 54 a patient of Dr. L. A. Archibald. She developed a febrile disease with cough and fetid expectoration 3 weeks after the extraction of teeth. In the absence of a history of previous respiratory infection a diagnosis of lung abscess had been made. A pleural injection was carried out by Dr. David H. Ballou. Koentgen film by Dr. A. H. Line.

lowing immediately upon an operation in a patient who had no previous respiratory infection is not necessarily sufficient to make a diagnosis of abscess of the lung. Figure 1 represents a case of which we have several parallels and which will serve as an example.

Concerning the clinical history of the illness nothing can be added that is new. Cough of a productive nature often blood stained with fetid fever chills sweats and chest pain as well as loss of strength and appetite would appear to be the most common symptoms in order of frequency. In an acute case the patient is quite often able to indicate the site of disease by the location of the pain. Constipation appears to be the rule while diarrhoea presumably of toxic causation was usually found to be a bad prognostic



Fig. 2. Case 2. Bronchiectasis in the left lower lobe in a patient of Dr. David H. Ballou injected bronchoscopically by him. Prior to injection this patient had been treated for pulmonary tuberculosis.

TABLE II—CAUSE

	Cases
Operations about the mouth	
Elastic on nose and mouth	1
Tonsillotomy	8
Extraction of teeth	11
Operations elsewhere	
Hæmorrhoidectomy	2
Cholecystectomy	1
Gastro-enterostomy	3
Hysterectomy	1
Trauma	1
Respiratory infections	
Bronchitis	7
Influenza	14
Lobar pneumonia	13
Bronchopneumonia	17
Repeated cold	10
New growth	1
Causation uncertain	8
	94

On examination 11 cases seen

sign and was frequently accompanied by evidence of involvement of the kidneys and the serous cavities.

The blood picture showed a leucocyte count varying from 6,000 to 38,000. Anæmia was frequently found and varied with the degree of suppuration and period of the disease. Sputum examinations as often as not failed to show elastic tissue.

The onset was usually with constitutional symptoms. The abscess remained closed from



FIG. 3. Case 3. Bronchiectatic abscesses with bronchiectasis (lateral view) in both lower lobes in a boy aged 13 a patient of Dr. Roddick Byers. The cavities required 50 cubic centimeters of lipiodol to fill them. Lipiodol injection by Dr. David H. Ballou. Roentgen film by Dr. A. H. Pirie.

a few days to a few weeks when foul expectoration made its appearance. In chronic cases in which the etiological factor was indeterminate and the clinical picture obscure the patients often presented a history of repeated upper and lower respiratory infections. They were of poor nutrition usually with thin flat chests and too often seeking operative interference when they had become extremely poor operative risks. Clubbing of fingers was noted frequently among this type. No case of true spirillum infection was recorded but thorough bacteriological investigation was often wanting. In a large percentage of those cases that did well the history was clear cut physical signs were well defined and definitely localized while the ordinary roentgenogram confirmed the picture by demonstrating a cavity with fluid level.

Roentgenogram findings varied. One could not always depend on and hope for the pres-



FIG. 4. Case 4. Pulmonary tuberculosis with bronchiectasis in right lung. Roentgenogram after lipiodol injection showed a normal bronchial tree in the left lung where bronchiectasis was previously suspected. Note the scoliosis, approximation of the rib on the affected side, acentrally placed trachea and apparent redundancy of the right lower main stem bronchus.

ence of a cavity with fluid level to make a diagnosis. Abscesses situated in the periphery of the lung appeared to show a fluid level more often than those situated near the root of the lung and were consequently more favorable for operation. Although the classical physical signs of cavity may be absent one must demand some signs for localization and not feel that in their absence ordinary roentgenograms are sufficient. Previous methods have been inadequate for making an accurate diagnosis in these cases. Such cases demand a more exact diagnosis if successful treatment is to be carried out. Fortunately we have recently acquired a new means of diagnosis in lipiodol injection.

Since the introduction of lipiodol into radiology with its application to lung mapping our views on the pathological diagnosis and treatment have been somewhat altered. We have had the opportunity of seeing lipiodol used by the bronchoscopic method in a fairly large group of lung suppurations and have been impressed with the following facts:

1. That the ordinary X-ray *per se* in a great many instances gives an ill defined anatomical



Fig 5 Case 5 Pulmonary tuberculosis with bronchiectasis and abscess right in a patient of Dr E A Archibald. Note the marked displacement of the trachea the extensive bronchiectasis with abscess formation where ordinary roentgen ray showed but a thickened pleura 20 cubic centimeters of lipiodol was injected in this case by Dr David H Ballou without ill effect

localization of the site of disease and even a false impression of the extent of the disease which clinical examination may often fail to correct. An excellent example is seen in Figure 7 Case 2

That localization of abscess of the lung if one is to obtain better results and shorter hospitalization must consist of as complete a definition as possible of the surrounding parenchyma and bronchial architecture. This is particularly true of the left chest behind the heart shadow and of the lung area below the dome of the diaphragm in which sites both ordinary roentgen films and clinical examination are apt to leave one uncertain (Fig 3 Case 3)

3 That more attention must be given to the demonstration of the area of healthy tissue both on the affected and on the non affected side before operation (Fig 4 Case 4 Fig 5 Case 5)

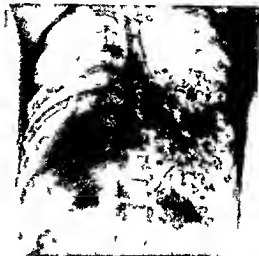


Fig 6 Case 6 Abscess of the left lung with bronchiectasis and empyema. Patient was a boy aged 12 years in the service of Dr E A Archibald. A bronchoscopic examination with lipiodol injection by Dr David H Ballou showed the left main stem bronchus to be stenosed. In the process of repair this stenosed bronchus became a dilated one

4 That the condition of the upper and lower respiratory tract is of importance in obscure cases. Such cases, if possible should receive preliminary bronchoscopic examination. The presence of stenosis carcinoma and foreign body can often be revealed only by this method. Direct smears and cultures should be taken whenever possible (Fig 6 Case 6)

This really means that ill-defined chronic cases should be treated in large hospitals where adequate investigation and treatment can be obtained at the hands of the internist radiologist bronchoscopist, and surgeon. It is true that the ordinary clinical investigation should always come first and that special investigation should come last but one must always appreciate the fact that most affections of the thorax come into the realms of the specialist. Some of the poor results so far obtained are due not to faulty treatment but in a sense rather to incomplete diagnosis.

Our later results and observations lead us to believe that lipiodol is a valuable help not only in diagnosis but also in estimating the effect of treatment during the course of that treat

ment and finally in estimating the ultimate results (Fig 7 Case 7)

The use of this agent promises that better results in the treatment of lung abscess will be obtained only when before beginning treatment the complete extent of the pathological process is ascertained, the response to treatment thus judged and the treatment checked up to see if it has accomplished its task completely. This can perhaps be illustrated in the following manner. A patient with pulmonary tuberculosis who in the judgment of the sanitarium physician is a suitable case for thoracoplasty is sent to the thoracic surgeon. The roentgenogram reveals the usual picture: the old healed spot in the good lung, the apical cavity with indefinite detail, the results of pleural thickening and fibrosis as shown by contracted ribs, the displaced heart, and the raised and adherent diaphragm. Such a case is undoubtedly suitable for thoracoplasty. In this clinic a more definite prognosis can be attempted in most instances as the result of the preliminary routine investigation which includes an injection of lipiodol by the bronchoscopic method. Thus the relation of a cavity to the hilus, the degree of associated bronchiectasis enables one to estimate the likelihood of the persistence of cough and expectoration. Further postoperative injection at a later date as illustrated by Archibald (3) will demonstrate the efficiency of collapse and in those cases that have persistence of cough and expectoration will reveal the cause for their persistence. All cases of pulmonary tuberculosis are not suitable for such treatment but we can see no contra indication at the present time to making injections in those chronic ill defined cases of abscess of the lung in which treatment promises to be difficult or doubtful and convalescence lengthy.

The following case report will perhaps serve as a more direct illustration particularly as to the routine of investigation that has recently been adopted for chest cases in the surgical service of the Royal Victoria Hospital.

Male, age 17 years, student, was admitted to the hospital July 8, 1925, complaining of cough, mucopurulent expectoration (1 ounce plus per day), dyspnea on exertion, and slight loss of weight (best



Fig. 7. Case 7. Abscess of the lung, right lower lobe with bronchiectasis in a patient of Dr. C. B. Keenan. This individual developed an abscess of the lung following a gastro-enterostomy for duodenal ulcer. The lipiodol injection illustrates how the injection may serve as an aid in estimating the effect of treatment. Twenty-five cubic centimeters of lipiodol was injected in this instance by Dr. D. H. Ballou. Roentgen film by Dr. A. H. Pine.

weight 128 weight on admission 120 pounds) night sweats and chilly sensations. Personal history is negative save for frequent epistaxis and head cold. The family history contains nothing bearing on present illness.

History of present illness is one of exposure to inclement weather on August 30, 1924, when the patient contracted a cold with cough followed shortly by mucopurulent expectoration. He was not confined to bed but was sent to the Laurentian Mountains where he improved slightly. On January 30, 1925, he was admitted to the service of Dr. David H. Ballou for a tonsillectomy. Because of a sudden profuse expectoration of foul sputum on the night of admission the patient was referred to Dr. Roddick Byers. Examination of the chest revealed signs at the left base suggestive of localized interlobar empyema. The fluoroscopic examination showed the heart shadow to blend with an indefinite shadow that made the heart look very large. Sputum analysis at the time showed non-odoriferous, yellowish grey almost pure polymorphonuclear pus with diplococci in chains both intracellular and free. No acid fast bacilli could be found. Some elastic tissue was present. On July 7, Dr. Byers performed a thoracentesis obtaining pus in the tenth interspace 3½ inches from the spine and at a depth of 2 inches. The patient was then admitted to the service of Dr. E. W. Archibald on the following day. Dr. Pine's X-ray report stated that there was a dense area at the base of the left lung but that no definite fluid



Fig. 3. Mother and son, a demonstration of the value of conservative treatment. This patient had acute salpingitis after marriage and was treated conservatively. Operation was performed 4 years later for relief of pelvic adhesions and sterility. Left hydrosalpinx was removed, the adherent occluded right tube was released, the tube opened, and air forced through the lumen of the tube into the uterine cavity. Pregnancy occurred within 5 months. A second baby is expected soon.

It had previously been our custom to remove notably diseased tubes of service patients after complete subsidence of acute infection. Now (in 1911) we began to avoid operation. Patients were isolated from their sources of infection, were forbidden to take douches, and were treated expectantly. As a result, it was found that those who suffer from only one attack of salpingitis rarely have severe symptoms or reveal extreme pathological changes. Even those who have been repeatedly infected tend to ultimate recovery if removed from consorts who are carriers of disease.

From bacteriological study combined with 5 years' conservative clinical experience we have concluded that operation upon fallopian tubes for eradication of gonorrhoeal infection is not often indicated. The infection disappears spontaneously if the patient is isolated from the source of her disease. Expectant care

eventuates in clinical recovery of the great majority of patients and is beneficial to those who must ultimately obtain operative relief. Surgery should usually be long delayed and reserved chiefly for sequelae such as adhesions, menstrual disturbances, and sterility.

To those who would ask whether operation is not always indicated in patients with a history of repeated attacks, I would suggest that the most satisfactory management is conservatism, such for example as a gynecologist of today might observe in the care of his sister before resorting to surgical intervention.

It may be thought that women can not be persuaded to abstain from exposure to repeated infection. This is seldom true. The difficulty lies in the fact that we have overestimated the persistence of a single infection and have not sufficiently emphasized the danger of subsequent exposure. When a sufferer from salpingitis is frankly informed that she must choose between prolonged abstinence and surgical removal of the genitalia, conservatism wins. (Occasional indulgence later with sheath protection is a helpful compromise measure.)

Streptococcus infection. Streptococcus infection of the tubes, as previously stated, is but part of more widespread pelvic involvement. The complete picture may, however, closely resemble gonorrhoeal disease. A history of abortion, a persistent tendency to aching distress in the pelvis, a prolonged tendency to light chills or low grade fever, are suggestive.

The tissues may yield bacteria for a long period of time. 6 months is fairly common; recovery of streptococci after 2 years is not infrequent; in one instance they were obtained 18 years after the initial infection.

Here, too, it seems best to operate only for complications or sequelae. When relief of symptoms demands intervention, 6 months is surely the minimum length of time to allow for subsidence of infection. If possible, operation should be postponed for 2 years or more.

When surgery is undertaken, we believe that a more radical attitude toward removal of infected ovaries is indicated in streptococcal cases because there is considerable danger of recurrent infection. Drainage is occasionally

expedient, even in the absence of pus and despite the fact that the use of drains in pelvic surgery is nowadays less in vogue

CONCLUSIONS

1 Operation by the vaginal route upon patients with chronic purulent leucorrhœa, introduces an increased risk of postoperative streptococcic pelvic peritonitis

2 The endometrium of the body of the uterus is nearly always free from bacteria. Supravaginal hysterectomy is therefore ordinarily a clean procedure

3 Mild infection of the endometrium is relatively frequent after diagnostic curettage. Hysterectomy should preferably be performed at the time of curettage or postponed until subsidence of the inflammatory reaction

4 Operation upon fallopian tubes for eradication of gonorrhœal infection is not often indicated because the infection tends to disappear if patients are isolated from consorts who are carriers of disease. Surgery should usually be long delayed and reserved chiefly for sequelæ, such as adhesions, menstrual disturbances and sterility

HEPATIC FUNCTION IN HEALTH AND DISEASE¹

By CHARLES H. MAYO, M.D., F.A.C.S., ROCHESTER, MINNESOTA

SMALL organs have often engaged the attention of great men but at the present time the liver, the largest organ in the body, is exciting the interest of many profound students.

HEPATIC FUNCTION IN HEALTH

Metabolism in sugar. The liver is not only the fuel storehouse of carbon in the form of sugar or glycogen from which store the blood sugar level is maintained, but it is also the site where glucose is made from other materials. Although nearly an equal amount of glycogen is stored in the muscular tissue, this probably has little to do with maintaining the blood sugar level but is for the immediate use of the muscle cells. Muscular activity is associated with partial combustion of glycogen to form lactic acid. Part of the latter is completely consumed, and part is reconverted in to glycogen between muscular contractions. During violent overstrain lactic acid is not quickly enough disposed of; its accumulation leads to the sensation of fatigue, since rest is necessary to clear the field for further action. The thyroid gland, with the best arterial circulation of any structure in the body, makes the energy of cells available for use as pointed out by Plummer. It may be said that its function is one which deals with oxidation.

The arterial supply of the liver, an organ weighing between 1,700 and 1,800 grams, is comparatively small while the venous blood from all the viscera in the abdomen is brought to it through the portal circulation carrying the products of digestion to be transformed and stored and the fluids from the colon, especially its right, have to be redistilled by its functional activity. Probably the most important of these products, as regards the action of the liver, is glucose. Its excess of carbon is in harmony with its purpose as sugar consists of three elements, carbon, twelve parts and the equivalent in hydrogen and oxygen of eleven molecules of water.

The exact functions of the liver have been most difficult to study and while many new facts concerning them have been recently developed there are still many of its functions awaiting elucidation. The first experimental investigations were made by ligation of its blood vessels and later by total abdominal evisceration in an effort to study as rapidly as possible while life lasted in the many types of animals used the changes in the blood as they occur before death from the loss of function or loss of the organ. The life of such animals under the methods described for eliminating hepatic function have been very short from a few minutes to only an hour or

two at best. It is impossible to remove all of the liver without including a segment of the vena cava. However if a portion of the liver is left in the body without blood supply the tissue is rapidly destroyed by autolysis which in turn causes a toxic condition differing very materially from the loss of liver tissue alone. This has impaired the accuracy of the results obtained by investigation in cases in which a portion of the liver is left *in situ* without blood supply. On the other hand most of the normal liver can be removed, a functioning portion with intact blood supply being left, and the remaining portion will be quickly restored by hypertrophy and hyperplasia. After at least 70 per cent of a dog's liver has been thus removed without producing a noticeable effect on the animal the approximate normal amount of liver tissue will be restored in 8 weeks. Mann developed a method of total removal of the liver in the dog which overcame the difficulties mentioned. He removed the organ in three stages. First after a reverse *Eck fistula* had united the portal vein and vena cava the latter was ligated proximal to the stoma. Later when a collateral circulation was established the portal vein was ligated. This ultimately permitted the total removal of the liver with but little impairment of return of venous blood to the heart from the lower limbs and abdominal viscera. Mann and his coworkers Magath and Bollman found that when the liver is totally removed, the blood sugar level is greatly lowered until at a definite point an animal which, having shown little apparent disturbance physically from the loss of the liver, suddenly develops muscular weakness and in a short time becomes moribund. However the injection of glucose 0.25 to 0.50 grams to each kilogram of body weight of the animal restores it immediately to normal. Without this death would have followed in a few minutes. If the blood sugar is maintained at approximately normal level by administration of glucose the animal may be sustained in a comparatively active physical condition for many hours, the longest time has been 35 hours. Death is eventually caused by other conditions than loss of sugar.

Metabolism of bilirubin. Bilirubin has long been regarded to a large extent as produced

in the liver and a portion in all probability is of hepatic origin. However it is also made outside the liver from hemoglobin in the reticulo endothelial areas of the body. The bilirubin content of arterial blood in all parts of the body is the same. Venous blood returning from the spleen or from bone marrow areas which contain reticulo endothelial cells shows a definite increase in its bilirubin content while the hile pigment content of venous blood returning from the kidney muscle, or from an extremity after removal of the bones only remains the same as that of arterial blood. When the liver is totally removed from a dog the animal becomes jaundiced because of the loss of the means of excreting the hile pigment that is produced in the spleen and bone marrow.

Metabolism of urea. Many nitrogenous compounds are very unstable when confined in condensed masses chemically the nitrogenous molecule becomes the explosive energy of warfare. In the body the protein matter taken as food is split in the intestines into many varieties of amino-acids. The amino acids are all taken into the blood and those which cannot be employed to restore tissue are changed by the liver into glucose and urea. About 60 per cent of the energy containing carbon portion of the protein is thus saved to the body as glucose while the nitrogen which the organism does not utilize is converted into urea and eliminated by the kidneys. When the liver is totally removed urea is not formed and uric acid is not destroyed proving that the liver is necessary for these important phases of nitrogen metabolism. The liver then not only furnishes the coal bunker but prepares the ashes of destruction in a form for removal. If the liver is removed during the hyperglycæmia following extirpation of the pancreas the blood sugar becomes lowered more rapidly but the conditions otherwise are the same.

Function of the gall bladder. There has been for a long time much discussion about the absence of the gall bladder in some animals. Its presence or absence does not seem to follow any definite rule and is never a familiar characteristic. With few exceptions however the leaf eaters have no gall bladders thus

group also includes those animals that cast their horns and antlers yearly. Leaves as a food have a higher calcium and potassium content than grasses. The pocket gopher, passing his life beneath the surface of the ground has no gall bladder while the striped gopher living beneath the soil but feeding above it has one. The rat has no gall bladder but the liver makes bile eight times stronger than the bile of the mouse which has a gall bladder.

The liver as well as the pancreas arises from a common diverticulum of the foregut. This elongates to form the common duct together with a solid outgrowth which becoming below later attaches to the hepatic substance to form the gall bladder. The great mass of liver tissue checks blood pressure to a low point within it while the gall bladder with its cystic artery has the full arterial pressure. Mucus cannot be as readily absorbed as bile. The mucous membrane of the gall bladder continues to form mucus after obstruction of the common duct. At first the gall bladder contents are saturated with bile salts which later become reabsorbed and the gall bladder and all ducts remain filled with mucus or so called white bile. The gall bladder contains approximately an ounce of bile under normal conditions. The cystic duct is one eighth of an inch in diameter, being tortuous like the letter S and unites with the common duct which approximates one sixth of an inch in diameter. Sweet has described minute sacculi distributed along the hepatic duct which could possibly to some extent absorb bile fluids. The gall bladder has no suction power and can fill from the common duct only by contraction of the terminal sphincter muscle of the common duct at its opening into the duodenum which has been given the name of its discoverer the sphincter of Oddi. Meltzer worked out the law of contrary innervation as applied to the gall bladder and sphincter of the common duct. He suggested that magnesium sulphate would relax the sphincter. Lyons, employing a Rehfuess tube passed from the stomach into the duodenum which makes it possible to deliver fluids into the duodenum uncontaminated by gastric juice, made use of this suggestion of Meltzer to develop his so

called physiologic drainage of the gall bladder. Peptone is also thought to relax the sphincter. Intraduodenal lavage with such solutions is supposed to cause the sphincter of Oddi to relax. The first bile that appears is darker than the bile of the hepatic duct and lighter than the bile from the gall bladder, this is followed by the dark gall bladder bile and later by the light bile flowing from the hepatic ducts into the duodenum from which it is sucked by the Rehfuess tube. On the other hand Sweet and Halpert contend that little or no bile which enters the gall bladder through the cystic duct leaves by that route. The pressure withstood by the sphincter of Oddi in the animals without a gall bladder is very low, being but a few millimeters of water. In such species the bile passes into the duodenum without obstruction. In those animals which have a gall bladder the pressure is not necessarily the same in the gall bladder as it is in the common duct and varies from 50 to 150 millimeters of water. The gall bladder in contracting during filtration closes its outlet. As a result of the association of activity of gall bladder and sphincter removal of the gall bladder is followed by relaxation of the sphincter of Oddi to the level of that in animals without a gall bladder as a rule. At the angle at which the pancreatic duct unites with the common duct, the sphincter of Oddi usually cannot accomplish its closure without interfering with the pancreatic duct. Fortunately the pancreas has two ducts usually connected. The pain in the back accompanying gall stone colic is probably due to pancreatic colic. In the gall bladder of man bile is ten to eleven times as concentrated as the bile in the hepatic ducts. In diseases characterized by dark bile and salts and stones it is much more concentrated than this.

Ligation of the common duct in animals with a gall bladder distends the gall bladder and probably increases its function of filtration of fluids. In dogs, sufficient bile pigment appears in the blood in from 24 to 36 hours to give a positive van den Bergh test. Clinical jaundice does not appear for from 72 to 120 hours. However, if the gall bladder is removed or the cystic duct ligated at the same time the common duct is ligated bile pigment appears

in the blood in amounts sufficient to give a positive van den Bergh test in from three to six hours and jaundice in twenty four hours. For some reason then in certain types of life there is a need for concentrating bile or for bile fluids to reach the blood stream through the lymphatics without coming in contact with the alimentary canal. In some animals without a gall bladder the presence of its physiologic equivalent has been demonstrated. In the case of man this may possibly have been more important ages ago than now, although only a few cases are on record in which there is congenital absence of the gall bladder in man.

HEPATIC FUNCTION IN DISEASE

Formation of gall stones. Gall stones are of varying color and density, single cholesterol stones crystalline and amorphous, are found in gall bladders with little change from the normal. Less concentrated cholesterol with varying quantities of bilirubin of calcium and bile salts form the great mass of gall stones. Among the thousands of patients operated on one practically never finds a stone in the process of formation although recent stones may be soft and others of varying degrees of hardness in the same gall bladder. A stone may increase by secretion of bile salts retained in a gall bladder compelled to filter an excess of bile fluids at a higher constant level of pressure produced by a contraction or spasm of the sphincter of Oddi. The trigger action of excess of fatty bodies in the blood and toxins of infection may suddenly and as quickly start and complete the formation of a stone or the addition of another layer to a stone as a hen can cover an egg with carbonate of calcium that is in one day. The conception of disease of the gall bladder from overwork is being recognized as the basis of the development of gall stones. The excess of cholesterol in the blood is eliminated by the liver. Cholesterol forms one fourth of the blood fat and it is increased in pregnancy. Cholecystectomy is now performed unless it is contra indicated by special complicating conditions. The gall bladder is darker if the liver is diseased its edges are rounded and not sharp and rapidly spreading like the normal axe like edge. It is

mottled and the fine lobulations on its surface are readily seen. The area of lymphatic filtration around the gall bladder attachment extending for 2.5 or 5 centimeters may show in many cases extensive connective tissue giving a local arrhotic appearance but of lighter color. The glands on the cystic common and hepatic ducts are enlarged in proportion to the hyperfunction thrown on them through excess drainage. Back of the trouble is the suggestion that stimulation of the sympathetic nervous system may account for spasm of the sphincter of Oddi which undoubtedly precedes and accompanies not only hepatic changes but diseases of the gall bladder itself and its secondary gall stones. The stimulation of the sympathetic system may be the result of changes in the hepatic function dependent in turn on injudicious eating and the strain of modern ways of living. The amount of sugar eaten by the individual has increased a pound a year for 100 years and now amounts to approximately 112 pounds.

An excess of sugar fuel above what can be immediately used or stored as glycogen is converted into fat and deposited in and over the body as such and like a blubber that insulates arctic animals is a hydrocarbon which is mostly again reconverted into sugar for burning in case of need.

We all have a most wonderful sugar machine of our own for reducing carbohydrate food to glycogen. Is it possible that we are stoking our human furnaces too heavily and burning out our boiler flues (the overworked kidneys) and that the retention of the ashes destroys our fire boxes and grates?

Nowadays we live in flats and kitchenette apartments and eat canned foods. Scientific progress permits us to enjoy preserved foods from every corner of the world but it is possible that man has physically failed to keep pace with such progress. These canned foods contain insufficient amounts of vitamins and in cold storage food the vitamin is in varying degrees of decay. It is possible that we are paying too heavy a price for our conveniences and luxuries at any rate these are points for investigation in the near future.

In 1910 Rowntree studied phenolsulphone phthalein as a test of renal function. During

his experiments he found that the chlorophthalins were eliminated by the liver and thrown into the alimentary tract with the bile. Tests of the stool gave but an approximate valuation of hepatic function. Rosenthal made thus more accurate by the test of injecting dye material into the blood and determining the rapidity with which it was removed from the blood by the liver.

Graham and his coworker, Cole, found that the bromine and iodine substitution products of phenolphthalein were eliminated by the liver and when thrown into the bile entered the gall bladder in a normal manner and made its size and shape visible by fluoroscope or roentgenogram. When it was in a diseased condition or contained stones, very little or none at all of the dye entered the gall bladder. This lack of visibility of the gall bladder made diagnosis of disease of it probable. The reaction of the injection has been overcome in the clinic by giving the phenoltetrabromophthalin in a capsule by mouth containing 0.1 gram of the dye for each kilogram of body weight. It is of assistance in those cases which puzzle the diagnostician. Mann showed that the liver has an affinity for the chlorines to the degree that the injection into the blood stream of from 5 to 10 cubic centimeters of the Carrel Dakin solution for each kilogram of body weight acts on the gall bladder and does not injure any other tissue unless a sufficient amount is used to destroy the animal. Repeated injections will seriously injure the viscus.

The bilirubin of the serum is now determined quantitatively and specifically by means of the van den Berg test. Whereas the content of normal serum never exceeds 2 milligrams for each 100 cubic centimeters, values up to 20 or 30 milligrams for each 100 cubic centimeters may be encountered in jaundice. The nature of the reaction also indicates in many instances whether jaundice is obstructive or hæmolytic in origin.

RELATION TO SURGERY

Status of the gall bladder. Years ago cholecystic disease was mainly considered to be gall stone disease and the operation consisted of cholecystostomy, removal of the gall stones and drainage, every effort being

made to conserve the gall bladder. There was no knowledge of the formation of the gall stone or the conditions leading thereto. Later advances led to exploration in many cases in which there were symptoms of gall stones, if no stones were felt the gall bladder was not opened, but if symptoms and more severe spells continued, within a few years a second operation would be performed and the gall bladder would not infrequently contain many stones. Cholecystitis or inflammatory disease was discussed and cholecystostomy performed on the gall bladder with adhesions, change in color, and thickened wall. Not only was the disease unaffected, but in many cases adhesions arose after operation which attached the gall bladder wall to the abdominal wall leading to more trouble than before operation and cholecystectomy entered the field of surgery for the diseased gall bladder, whether stones were present or not. At this time a sufficient interval had elapsed since the original removal of gall stones for many patients to have had recurrence of symptoms, and operation for the removal of newly developed gall stones a second or even a third time within a few years. It was concluded that the gall bladder was probably not so important a structure as it was at first believed and like a diseased tonsil a diseased gall bladder could be removed with benefit to health.

Operative risks. Bile in the blood from obstruction of the common duct, greatly delays its coagulation time. Hæmorrhage is one of the serious risks of operation during conditions of jaundice. While many have made a study of this problem in the clinic it has been carried on by Hallenbeck and Giffin and finally standardized by Walters who prepares such patients by injecting intravenously 5 cubic centimeters of a 10 per cent solution of calcium chloride once daily for 3 days preceding operation, in hundreds of cases we have had no untoward accident or local destruction of tissue from these injections such as have been described. This method brings the coagulation time, which has been from 12 to 20 minutes, down to from 6 to 9 minutes and greatly lowers the risk from hæmorrhage. The improvement is maintained if, in the operation, the surgeon is able to provide drainage of

bile internally and externally, and thus relieve the tension in the liver regardless of the cause of obstruction. Many persons chronically sick who have taken but little food for weeks have difficulty in maintaining their blood sugar level. Therefore sugars are given by mouth and glucose by bowel if required before or after serious operations.

The most common cause of death following surgical operations is disease of the lungs, the next renal complications and the third cardiac complications, although the latter condition is most feared by those who are ill.

Embarrassment of hepatic function. When the liver is under continued stress from congestion and the higher pressure from spasm of the sphincter of Oddi, it continues to form bile. On account of the low blood pressure in the liver tissue the back pressure is not so serious nor so rapid in its results as chronic obstruction of the urinary bladder by a hypertrophied prostate and the sudden relief of tension caused by draining the hepatic duct in cases of jaundice with white bile is seldom associated with the same risk as attends the sudden emptying of the greatly distended urinary bladder in old men, although a sudden cessation of hepatic function sometimes follows, comparable to the cessation of renal function. Greatly distended gall bladders require mechanical devices to provide for slow emptying.

In certain cases, when the liver is not functioning adequately, it may be relieved or as-

sisted. Administering bile frees the gall bladder under tension during fasting. Its flow is increased by ox gall and nitrogenous food, but not by calomel. Rich carbohydrate food checks it. In the chronic deficiency of the liver associated with cirrhosis and splenic enlargement the removal of the greatly enlarged spleen reduces by 20 per cent the work of the liver and relieves and conserves the organ. In the probable deficiency consequent to chronic general disease with emaciation, the physician must think of the lack of liver glycogen to maintain blood sugar, and nourish the patient accordingly. If any kind of operation is required for such patients the surgeon must be prepared to restore blood sugar by the intravenous injection of glucose, and also to maintain a normal or higher temperature during and after operation. By such conservative methods the old death rate of from 10 to 15 per cent attending operations in the presence of jaundice has now been lowered to 3.5 per cent.

Ascites may not be entirely the result of hepatic deficiency, but may depend on some obscure systemic defect. Treatment by novasurol has shown more satisfactory and more permanent restoration of hepatic function than the mechanical withdrawal of the fluid. The embarrassment of the liver in cirrhosis with ascites is not to be explained entirely by the vicious circle of endogenous and exogenous pressure.

CARCINOMA OF THE MALE BREAST¹

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THE etiology of carcinoma of the male breast is undoubtedly the same as of carcinoma elsewhere. Differences in function probably account for its comparative rarity in the male.

The male and female breasts are embryologically of the same origin and develop alike until puberty. At this period the female breast undergoes a marked change coincident to the development of sex characteristics. New ducts, glandular elements and so forth, are formed. Pregnancy produces another characteristic change, namely an hypertrophy and hyperplasia of the glandular structure which is followed by regressive changes at the cessation of lactation. Finally after the menopause the glandular elements atrophy. This marked difference in function with rapid proliferation and regression during pregnancy (which may be often repeated) and the regressive changes following the menopause explain to a certain extent the more frequent occurrence of carcinoma in the female breast.

Carcinoma of the male breast was first recognized and described by Thomas Bartholinus (1616-1680). Our present knowledge of this condition is based on the *Poirier Thesis* (1883) and the analysis of 100 cases by Williams in 1889 and 472 cases by Schuchardt in 1890. Williams in a series of 2,422 neoplasms of the breast found 2,397 in women and 25 in men and of the latter only 16 were carcinoma. According to Schuchardt, the percentage of occurrence in men as reported from various sources is from 1.8 to 8.4 per cent. Later Warfield in 307 cases of carcinoma of the breast found three in males. In the present series 1,751 were in females and 17 in males.

The relative occurrence in the two breasts has been variously reported. Fitzwilliams sums it up and says in 296 recorded cases of carcinoma of the male breast, 143 were on the

left side and 148 on the right, while in 5 the condition was bilateral. In our own series the left breast was affected in 10 cases and the right in 7.

It is generally accepted that the disease occurs a few years later in males than in females, although Blodgett reported finding it in a boy aged 12 years and Bryan observed it in one at the age of 14 years and 8 months. In Lunn's report the oldest patient was 91 years. In our cases, the oldest was 72 years and the youngest 38 years, the average age being 52.6 years. Eight of the 17 male patients were in the fifth decade.

There was a history of injury to the breast in only one case, and in only 4 was there a family history of cancer.

The known duration of the tumor before operation is variously stated as from 1 to 3 years. However a search of the literature reveals a report by Owens and Eisendrath with the history of a patient who had a tumor of the breast for 35 years while Moore records the case of one who had a tumor for only 2 weeks. One of our patients gave a history of a tumor for 18 years, although increase in size had occurred for only 2 years preceding operation. The shortest history was 4 months with the average duration 31.2 months.

The pain, bloody discharge from and retraction of, the nipple, and ulceration vary with the type, situation, and extent of the carcinoma, the variations being similar to those of carcinoma found elsewhere in the body. That ulceration in the male breast is more common than among females is readily understood when one considers the normal relative difference in the distance from the overlying skin in the two sexes. Differences in the amount of retraction of the nipple are shown in Figures 1 and 2. Figure 3 shows a still more advanced type and illustrates ulcer

TABLE I—CARCINOMA OF MALE BREAST

Case	Age	Family history of carcinoma	Duration in years	History of injury	Breast involved	Glandular element	Examination of nipple	Grade	Remarks
1	44				Left	+		4	Died 1 year after operation multiple metastases
2	7	M the died carcinoma of breast	1		Left	+	+	4	Died 2 months after operation peritoneal carcinomatosis
3	6		1 1/2	+	Right	+		4	Pat still located
4	56		1 1/2		Left	+		3	Died 6 years after operation necropsy showed carcinoma
5	43	F the died carcinoma of liver			Right			4	Lived 6 years after operation patient in good health but with carcinoma of the bowels
6	69		1		Right			3	Died 1 day after operation
7	4		3		Right	+	+	3	Simple amputation elsewhere 15 months before operation after operation he died 6 months later
8	49		2		Right	+		3	Simple amputation elsewhere 15 months before operation he died 6 months later
9	34				Left	+		3	Dead date and cause unknown
10	49		1 1/2		Left	+		3	Elective mastectomy operation roentgenogram showed multiple metastases in the lungs and in the pelvis
11	37	M the died carcinoma of stomach	1 1/2		Right	+		4	He died 2 months after operation
12	46				Left	+		4	Simple amputation performed elsewhere 15 months before operation
13	48	F the died carcinoma of stomach	6		Left	+		4	Six months after operation roentgenogram showed multiple metastases in the right pelvis bone and in the diaphragm
14	43				Left	+		4	Good results after operation
15	38				Left	+		4	Unable to locate
16	55		3		Left	+		4	Died 6 years after operation hyperphosphatemia
17	6		1		Right	+		4	Lived 8 years after operation

*Roentgenograms of the best available cases

ation also metastatic nodules. Protrusion of the nipple is shown in Figures 4 and 5. In Figure 6 the original site of the neoplasm was probably as remote from the nipple as possible and the nipple involved by extension. Involvement of the nipple is the rule not the exception because of its inherent susceptibility to carcinoma but because of the small amount of glandular tissue underlying it.

A radical operation was performed on each of our 17 patients. One death occurred, making an operative mortality of 5.8 per cent. Eleven of the 17 patients had one or more roentgenological treatments postoperatively. Eight of the 11 are dead and we were able to obtain information as to the postoperative length of life in all but 1. The average duration

being 22 months. Three patients are known to be alive 1 for 3 years, 1 for 16 months and 1 for 6 months. Six of the patients did not receive postoperative treatment with the roentgen ray and of those 3 are dead 1 after 4 years, 1 within a month and 1 was reported dead but the length of life not stated. One is alive 6 years after operation and 2 have not been located.

In 14 of the 17 patients we performed the primary operation. In 3 the radical procedure was for recurrence 15, 18 and 24 months after simple amputation done elsewhere. One of the 3 patients had no evidence of a recurrence 18 months after the secondary operation, 1 died 18 months and 1 10 months after operation. Two of the 17 patients have never



Fig 1 Small neoplasm immediately beneath and involving the nipple producing retraction of it



Fig 4 Small neoplasm immediately beneath and involving the nipple producing protrusion of it



Fig 2 More advanced stage of retraction of nipple than in Figure 1



Fig 5 More advanced stage of protrusion than in Figure 4

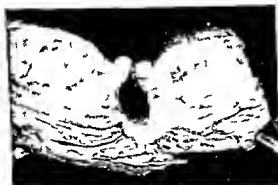


Fig 3 Still more advanced stage of retraction than shown in Figures 1 and 2 with ulceration and metastasis

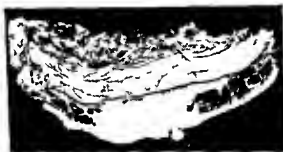


Fig 6 Involvement of the nipple by direct extension from a distant neoplasm

been heard from. Two were reported dead but the date and cause of death were not given. One patient died after operation from erysipelas. Seven died from metastatic lesions demonstrated in necropsies performed here or reported by physicians elsewhere. The greatest postoperative duration of life

was 6 years and the least 7 months, the average being 19.5 months. One patient died following nephrectomy for hypernephroma 4 years after the radical amputation of the breast for carcinoma and at necropsy no evidence of metastasis from the original tumor was found. Four patients are alive and show no evidence of any recurrence 6 months, 16 months, 3 years and 6 years after operation.

Thirteen of the 17 patients had varying degrees of glandular involvement. Of the remaining 4, 1 has lived for 6 years and 1 for 3 years since the operation. 1 has not been traced, and 1 was reported dead but no information was given as to the date or cause of death.

These cases as a group showed a very high grade of malignancy when classified according to the method of Broders. 8 were graded 4, 6 were graded 3, 2 were graded 2 and in 1 case the tissue had not been preserved. That a high grade of malignancy is the rule in cases of carcinomata of the male breast cannot be definitely asserted as our observations are based on a small group but nevertheless it would seem to explain the uniformly poor ultimate results obtained even with the most radical operative procedures.

CONCLUSIONS

1. It is probable that carcinoma of the male breast in most instances is a highly malignant type of neoplasm.

2. The results of radical operation for cancer of the breast are not as satisfactory in males as in females, very likely because in the former the tumors are generally of a higher degree of malignancy.

3. Tumors in the male breast should receive immediate radical operative treatment.

4. Good results are obtainable only by radical operation before glandular or other metastatic lesions occur.

5. Roentgenological treatment postoperatively does not seem to have arrested the progress of the disease to any appreciable extent in this series of cases.

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TUMORS OF THE URACHUS¹

WITH REPORT OF SEVEN CASES

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BENIGN pathological conditions in the urachus are not uncommon and a great deal has been written of them. There is much less in the literature on malignancy of this structure, probably because this condition appears less frequently than the benign and probably also because malignant growths have been frequently overlooked. It is extremely difficult in some cases to draw a fine line of distinction between tumors of the umbilicus and those of the upper portion of the urachal tube. However, it must be remembered that a large percentage of pathological conditions of the urachus occur in its lower half.

In early fetal life the urachus develops from the allantois and until about the second or third month normally remains patent. At that time it becomes obliterated and forms a cordlike structure running from the apex of the bladder to the umbilicus and serves as a median suspensory ligament of the bladder. The canal does not become obliterated simultaneously throughout its length but at irregular intervals so that small areas remain in which the lumen still persists. These may disappear later or they may persist in the form of spindle-shaped cavities which probably give rise to many of the urachal cysts which we see clinically. The lining of this urachal tube is composed of one or more layers of transitional epithelium, very much like the mucous membrane of the bladder. There is a circular and a longitudinal coat of non-striped muscle about the canal which in turn is surrounded by connective tissue (Fig. 1).

It seems fairly well established that many persons go through life without symptoms with urachi which we do not consider normal. Urutz (2) examined 74 bodies for cysts of the urachus and in this number he found 24 undoubted instances. Morse (7) in 21 consecutive postmortems found 13 cases in which

either a cyst or a patent urachus existed. In none of these cases had there been any ante mortem indication of these pathological conditions. Of these 13 cases, 5 were females and 8 were males. This sex relation is near that given by Cullen (1) who found that in congenitally patent urachi, of 53 recorded, 35 were in males and 18 in females. However, Weiser (12) found in 89 cases that the sex ratio was 3 females to 1 male. The average age in the cases examined by Morse was 43.7 years. Gibb (4) says that cysts occur more commonly in females while the patent urachus is more commonly found in males. He believes that this is true because of the greater occurrence of urethral strictures in men and also because of prostatic conditions which may cause urinary obstruction.

Patent urachus (Fig. 2). As we have said many persons with patent urachi go through life ignorant of the condition which is present. If by any chance there should develop some obstruction to the normal urinary outlet with sufficient back pressure a patent urachus might be brought to light for the first time. Just such an instance was recorded by Gibb (4). In a male 74 years of age, for 3 years there had been a gradual decrease in the amount of urine passed through the urethra. There was then an increased flow of urine at the umbilicus and one month before treatment was instituted all the urine was draining from an umbilical sinus. It was found that he had an enlarged prostate which was causing obstruction. A suprapubic prostatectomy was done followed by bladder drainage for 12 days, with complete recovery.

A patent urachus may be closed in any part of its extent. It may be open at either end or both. The openings may be large or small, usually the bladder opening is the larger and often it is so large that the sacculated lower

¹This material for this paper is from the M. Y. Clinic of Surgery, M. Y. Clinic.

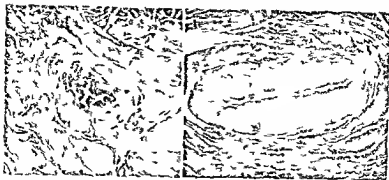


Fig. 2 (left) Showing a urachus near the bladder attachment ($\times 60$)
 Fig. 3 Showing a patent urachus at its bladder attachment ($\times 30$)

end of the urachus form a receptacle as large as the bladder itself. The urinary drainage at the umbilical end of the canal may be a few drops in a day or it may be a large stream of urine especially when the patient is voiding. In Paget's (8) case reported in 1860 the patient voided urine through the umbilicus whenever he lifted a heavy object or micturated. Any act which increases the intra-vesical tension increases the possibility of drainage from the umbilicus when a patent urachus exists. This actually occurred in Case 1. When the patient stretched urine and a purulent material would discharge from the umbilicus.

CASE 1. Miss E. S. aged 26 came complaining of kidney and bladder trouble. Every 3 to 4 days for 9 years the patient had had pain between the symphysis and the umbilicus as excited with a purulent and occasionally a bloody discharge from the umbilicus. At times there was urinary discharge with radiating pain downward into the bladder region. The pain and discharge almost invariably would follow the act of stretching. There was marked increase in frequency of micturition, burning after voiding and occasionally there was blood pus and stringy material in the urine. The physical examination was essentially negative save for slight induration and tenderness in the midline between the symphysis and umbilicus. A 4 hour specimen of urine showed a slight amount of albumin and a few pus cells. The blood count showed a normal red cell determination, white blood cell 7,800, hemoglobin 60 per cent and the Wassermann was negative. Roentgen ray plates of the kidneys, ureter and bladder were negative. Cystoscopic examination showed a real cystitis III on the basis of IV. A diagnosis was made of a patent urachus and operation advised. At operation the umbilicus and the urachus with the two obliterated hypogastric arteries were excised. The urachus

was small and cordlike in structure with no evidence of tumor formation. Grossly it was not possible to establish the presence of a lumen in the urachus. The peritoneal cavity was not opened. Pathological examination of the specimen revealed a cyst of the umbilicus approximately 1 centimeter in diameter which drained a sinus originating in a patent urachus. The lumen of the urachus was 1 to 1 millimeter in diameter throughout its entire length. The bladder was irrigated following the operation with great improvement and the patient was discharged from the hospital apparently cured.

It is difficult to say just what relation the persisting urachus could have had with the severe cystitis in this case. From the history the bladder symptoms appeared at about the same time that the umbilical discharge was first noticed. That there was a definite relation between these two conditions seems fairly certain as the bladder condition rapidly cleared up with the excision of the fistulous tract and with bladder irrigations following the operation. It is our belief that the patent urachus harbored a low grade infection and that this constituted the source of infection for the bladder and that the vesical symptoms promptly disappeared following the eradication of this focus of infection.

Large cysts infected cysts cysts with fistulae or with neoplastic degeneration are the only ones which we consider surgical. Probably the largest known cyst of the urachus was Phipman's case reported by Cullen. The mass filled the abdomen and contained 5 liters of fluid. The larger cysts may be pedunculated and extend into the abdominal cavity. Means (6) reports a case of a young man 32 years of age who for 3 months had

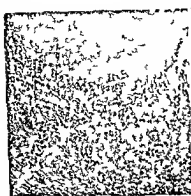


Fig 3

Fig 3 An occasional foreign body giant cell, numerous plasma cells and fibrosis in the old chronic area, and many polymorphonuclear leucocytes and some necrosis (X 70)



Fig 4

Fig 4 Fibroma (X 120)



Fig 5

Fig 5 Showing spaces variable in size lined with pseudo-stratified columnar epithelium, and within the lumen exudate of serum and red blood cells. Adenoma (X 120)

been troubled with a sensation of pressure and soreness in the lower abdomen between the symphysis and the umbilicus. The patient had felt a mass some time before which was definitely palpable at the time of his examination. At operation a large pedunculated cyst was found hanging free in the abdominal cavity and completely covered with peritoneum. The cyst was removed with the remnants of the urachus to which it was attached.

Abscess and infection of a cyst or a patent urachus may give a train of constitutional symptoms suggesting infection, but the location of pain which is usually present gives the clinician an indication as to the probable cause of the trouble. The abdominal pain at times is exaggerated by deep breathing and may be more marked when the patient is walking erect. There may be chills and fever, anorexia, loss of weight and indigestion. In some the abdominal pain is the predominant complaint and is usually located in the midline between the umbilicus and symphysis. Diarrhea has been reported as a symptom although it is rare. Usually there are few or no bladder symptoms present unless the infection has spread to the perivesical structures or the infection has produced a secondary cystitis. An abscess is usually adherent to the posterior rectus fascia in front and to the peritoneum behind and if the infection is acute and extensive the omentum nearby may be adherent to the parietal peritoneum.

CASE 2 Mrs P B G aged 55 presented herself complaining of rectal trouble, tumor in the abdomen and a discharge from the navel. This trouble began about 10 years previously when a doctor found an abdominal tumor. An operation was advised but was refused. About the same time the umbilicus began to drain pus and blood and ever since that time the navel has drained at irregular intervals. There was usually a scab at the site of the drainage and when it was removed pus and blood would escape from the navel. There had been no increase in the size of the abdominal tumor and it had never been tender although she had noticed that she would feel better when walking stooped slightly forward. Six years previously she had had a purulent and bloody discharge from the vagina for a few weeks which she said was of the same character as the drainage from the umbilicus.

The physical examination was of a fairly well developed and nourished individual. There was an abdominal tumor midway between the symphysis and the umbilicus, apparently with no attachment to the uterus which seemed to be connected to the abdominal wall and the umbilicus. The tumor was more to the left side than in the midline. There was a small sinus at the navel which was discharging small amounts of purulent and necrotic material and the surrounding skin was reddened, thickened and excoriated. The urine showed some albumin and a large amount of pus. The blood count was entirely normal and the Wassermann was negative. Roentgen ray examination of the large bowel showed a spastic colon. Proctoscopic examination revealed a few small internal hemorrhoids and the mucous membrane of the anal canal was very friable and easily torn.

At operation an incision was made from the symphysis up to and encircling the umbilicus. The mass was apparently in the abdominal wall and extended more to the left side than to the right. The



Fig 6 Photograph of specimen showing urachus with mass and exposed bladder wall attached. The specimen has been in preserving fluid

peritoneum was opened and the tumor mass which was about 1 centimeters long and 10 centimeters wide was removed with a large portion of the right rectus and about two thirds of the left rectus muscle together with the peritoneal attachment. The omentum was firmly adherent to the parietal peritoneum. The omentum was resected and tied off the dome of the bladder to which the tumor was attached at its lower pole was removed in a circular incision and a piece of the bladder approximately 5.5 centimeters in diameter was excised.

The pathological examination revealed an abscess of the urachus. The mass removed measured 12 by 8 by 8 centimeters with peritoneal and omental attachment on its posterior surface and the bladder attachment at its lower pole. On serial section of the mass an abscess cavity 4 by 3 centimeters was found in the central portion. The walls of the cavity were from 4 to 6 centimeters thick and on microscopic examination showed an acute infection on a dense and ancient inflammatory process without evidences of malignancy (Fig 3). The patient died from peritonitis the eighth postoperative day. No postmortem was permitted.

It is interesting to note the postural relief in this case. The patient said that she felt better if she walked stooped slightly forward. This fact has been noted in a number of instances. Atton reported the case of a soldier who had this same postural relief. Ward (11) reported a patient who had a suppurative cyst of the urachus and who experienced relief from pain when he walked stooped forward. Davis also reports a case in which there was relief of pain when the patient was lying with the legs flexed on the abdomen. It is interesting that such a tumor of the abdominal wall could persist so long and apparently without change. The patient said that there had been no change in the size of the mass since it was first noticed. If this had been infected for this long period it must have been a very low grade type and the tissues had continued to handle this burden without difficulty. There was no doubt but that

this was an infected urachus as the location was exact and its anatomical connections distinct.

CASE 3 While the diagnosis was not proved at operation it seemed certain. Baby R. F. female aged 20 months was apparently a normal baby at birth being the first child of healthy parents. The delivery had been normal. At 12 months of age the patient had several abscessed glands of the neck which were drained operatively and were considered by the home doctor as tuberculous. The child had been perfectly well after this until 10 days prior to admission when she awoke out of a sleep with a fever of 104 degrees, vomited and appeared to be sick. She then seemed well for the following 4 days then became very restless and constipated and mineral oil and milk of magnesia were used with some improvement in the condition. On the fourth to fifth day after the onset she again had fever of 104 degrees and vomited. At that time the abdomen was distended and has remained so ever since. For 7 days there had been a temperature of from 99 to 103 degrees. The physical examination revealed a well developed and nourished baby with no apparent adenitis. The abdomen was markedly distended and there was definite spasm of the rectus muscles. Around the umbilicus and involving it was a red dened area about 3 1/4 centimeters in diameter. The urine showed a slight amount of albumin, an occasional red blood cell and many pus cells. The white blood count was 18,800 and the hemoglobin was 53 per cent. On cystoscopic examination a diagnosis was made of the right renal tuberculosis and possibly of the left kidney. At the time of cystoscopy an opening into the bladder near the dome was seen and a diagnosis was made also of a patent urachus. After 4 days of hot dressings the umbilicus began to drain large amounts of foul thin pus. A probe passed into this sinus would take a downward course toward the symphysis for a distance of about 5 to 6 centimeters. This patient was in the hospital for several weeks and improved greatly. It was felt that the condition was too acute to warrant radical treatment.

This case was certainly one of an abscess of a patent urachus complicated with renal tuberculosis and unfortunately we have been unable to follow it. In view of the past history of suppurative adenitis and the clinically tuberculous condition present the possibility of a tuberculous urachus must be considered. This was not proven although it must enter into the differential diagnosis.

Powell (9) reports the case of an abscess in a patent urachus in a child 9 months old. This child was of a normal confinement. The umbilical cord separated the ninth day but the wound never completely healed. The child always cried when voiding and the urine showed blood, pus and albumin. There was tenderness over the lower abdomen and a small globular mass was palpable in the mid

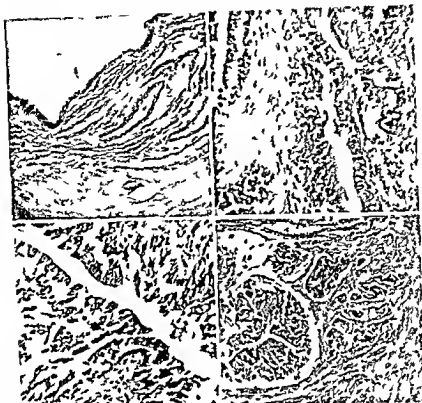


Fig 7 (above left) Showing urachus 2.5 centimeters above tumor mass No evidence of malignancy ($\times 60$)

Fig 8 (above right) Showing urachus 1.5 centimeters above bladder attachment with malignant degeneration of epithelium ($\times 120$)

Fig 9 (below left) Showing malignancy in urachus 0.5 centimeter above bladder attachment ($\times 120$)

Fig 10 (below right) Showing section taken at the edge of tumor mass in the bladder wall. Atypical glandular arrangement is shown with invasion into surrounding tissue ($\times 60$)

line just above the symphysis. Occasionally the mass enlarged and extended and at such times there was fluctuation. An abscess of the urachus was diagnosed. This was drained through the incision directly over the mass and an uneventful recovery followed.

Eastman (3) reported the case of a 19-year old woman who had pain, heat and redness about the umbilicus for 5 weeks associated with bladder tenesmus and frequency. There was a spontaneous opening at the navel and from that time on all the urine drained from this sinus. At operation a mass with the fistula was excised and microscopically was found to be tuberculous. He believes this condition was primary in the urachus.

He reports also a second case of tuberculous urachus. A woman 19 years of age had been troubled for 3 months with pain and a small swelling between the symphysis and the umbilicus. At operation a fistula was found extending down into the space of Retzius and to the bladder. Microscopically milary tuberculosis was found. For months there was a purulent drainage from the wound. Examination of the urine, chest, abdomen and bladder were negative.

When abscesses of the urachus are treated surgically, preferably by drainage, a large percentage of them will be cured. If an inflammatory mass is present, excision is necessary and should be done without opening the



Fig. 11 (left) Showing stratified epithelium and fairly thick layer of cornified epithelium in outer portion ($\times 120$)

Fig. 12 Showing mass of undifferentiated epithelial cells arranged in glandular formation and invading the underlying tissues

peritoneum if possible. If there has been a long standing infection the parietal peritoneum is usually adherent to the under surface of the mass and it may be impossible to remove it without opening the peritoneal cavity. Under these conditions the gravity of the operation is greatly increased because of the possibility of contamination as in Case 3. Expectant treatment, drainage and hot fomentations can be instituted and the mass extirpated when the infection has subsided.

CASE 4. Mrs. E. C. A. aged 45 came because of an indefinite history of abdominal bloating, gas, belching and constipation. She had had a few abdominal attacks of pain which were indefinite in character. She had lost about 6 pounds of weight in 4 or 5 months. General physical examination was negative save for slight tenderness over the gall bladder region. The examination of the urine was negative. The gastric analysis showed total acids 42 and free hydrochloric acid 24. A diagnosis was made of chronic cholecystitis and appendicitis. At the time of the operation a small mass was felt in the midline below the umbilicus which seemed to be between the peritoneum and the muscles of the abdominal wall. Upon exploration the mass was found about the size of a hen's egg, adherent to the tissues below the umbilicus and apparently originating in the urachus. This mass was easily extirpated and the wound closed. Pathological examination established a diagnosis of fibroma of the urachus (Fig. 4). It was attached to the upper termination of the urachal tube, which presented as a cordlike structure ending in the tissues of the umbilicus and just above the peritoneum. Fibromata and myomata of the urachus are rare and little in the literature has been written on them.

CASE 5. Mr. C. W. McD. aged 46 had had typhoid at 19 years of age, a Neisser infection years ago and a chancreoid 8 years ago. He presented himself complaining of bladder trouble. Two years previously while lifting a heavy weight he had a sharp pain in the right lumbar region. Two days later he noticed blood in the urine which has been present at irregular intervals ever since. He said he had passed gravel and pus in the urine 6 months ago. Three months ago he passed some fleshy masses in the urine and at the same time he had several colic like pains and marked frequency of urination. These pieces of tissue were taken to a doctor who after microscopic examination said they were cancer. Since the onset he has had marked frequency of urination with pain at the end of micturition when he passes blood and pus. He has had a bearing down pain in the lower abdomen and has lost 20 pounds of weight in the last 2 years. The patient was a very thin and poorly nourished man. There was a tender mass palpable just above the symphysis and with one finger in the rectum it was felt as a through and through mass just above the prostate. The rectal examination was very painful. Urinalysis showed a moderate amount of albumin, red blood cells and pus. No tubercle bacilli were found in the urine. The hemoglobin was 90 per cent. Roentgen ray plates of the kidneys, ureters and bladder were negative. Cystoscopic examination revealed a multiple diffuse papilloma covering the roof and upper half of the bladder, multiple based resembling exaggerated granulation tissue areas as though of prevesical origin. A clinical diagnosis was made of tumor of the bladder. At operation a suprapubic exposure of the bladder was made. There was a tumor involving the lower end of the urachus and the dome of the bladder. The dome of the bladder with the urachus attached was removed. The mass measured 8 by 8 by 6 centimeters. The urachus measured 9 centimeters in length; it was 1.5 centi-

meters at its greatest diameter and 3 millimeters in diameter at the tip and the tumor involved its lower third. To the lower pole of the mass was attached the excised portion of the bladder. The entire mass was markedly lobulated, moderately firm and fairly well circumscribed; the gross appearance gave the impression of malignancy. Upon microscopic examination it was found to be an adenoma extending into the dome of the bladder (Fig. 5).

This case is of especial interest, as it is quite similar to one of the cases reported by Schwarz (10).

Schwarz's patient was a man 57 years of age who after a fall noticed pain on urination and hematuria. At intervals afterward he had noticed blood in the urine and at one time had passed fleshy masses. This continued for a year before he presented himself for examination. It was impossible to palpate any abdominal mass because of marked obesity, but there was an area of dullness between the symphysis and the umbilicus. Urinalysis showed many pus cells and a few epithelial cells. The cystoscopic examination revealed an area about the size of a 10 pennig piece at the apex of the bladder with mucous membrane of unusual appearance which was described as a defect in the mucous membrane. A diagnosis was made of an extravesical tumor. The operation was performed by Prof. Ferthes. A mass the size of a goose's egg was found in the space of Retzius which crowded the bladder downward and backward. The tumor was freed easily from the anterior structures but was adherent posteriorly, had perforated the peritoneum and was intimately connected to the apex of the bladder. From the upper pole of the tumor was a cordlike structure running to the navel. The tumor was removed together with a circular portion from the dome of the bladder and the peritoneal attachment. The bladder and peritoneum were closed; the bladder drained with a retention catheter and the space of Retzius drained with a small rubber tube. The patient was dismissed from the hospital the fifteenth postoperative day in good condition. The pathological report was adenocarcinoma of the urachus with attachment to the dome of the bladder.

These two cases are similar in several respects. The symptoms occurred after some physical exertion in one fall and in the other the lifting of a heavy object. There was pain in both intervals hematuria and the passing of fragments of tissue. The cystoscopic examination in the 2 cases was similar, an unusual appearing mucous membrane in the dome of the bladder and in each instance the deduction was made that the original tumor was probably intravesical in origin. While in the case of Schwarz's patient the diagnosis

was carcinoma and in ours it was adenoma, the clinical signs were in many ways the same. The first thing that drew serious attention to the trouble was blood in the urine and this obviously must have come from some place within the urinary tract. Here then must possibly be a life saving factor that these tumors invade the bladder or cause pressure upon it and give rise to vesical symptoms. Were this not so and in the absence of pain the growth might go on to such an extent that operative procedure would not give a cure as metastasis or the direct extension would have rendered the tumor inoperable. In view of the lack of physical findings the cystoscopic examination was the only means by which the diagnosis was made possible.

CASE 6. Mr. C. W. L. aged 66 presented himself complaining of kidney trouble. He denied venereal infection and the family and past histories were negative. The complaint dated back 27 years when he had a sudden and severe colic in the lower abdomen radiating around to the back associated with nausea, vomiting and with blood and clots in the urine. He had no further trouble for 12 years when he had a recurrence of the same type of attack with blood and clots in the urine. He was then free from trouble until a few weeks prior to his admission when he had the third attack identical in nature to the other two. Since the last attack he had had blood and clots in the urine and a few mild attacks of lower abdominal pain. There had been marked frequency of urination and the patient had lost 30 pounds in weight in 5 years.

The physical examination showed an old man who had apparently lost considerable weight and had marked arteriosclerosis. The Kolmer reaction was positive 44. Urinalysis revealed a large amount of albumin and red blood cells and a small amount of pus. The urine was stained for spirochetes but none were found. The blood count showed hemoglobin 58 per cent, red count 5,780,000 and white count 9,800. The phenolsulphonephthalein return was 50 per cent. Roentgen ray plates of the kidneys, ureters and bladder as well as of the chest were negative. Cystoscopic examination done March 23, 1923, showed an area on the anterior portion of the dome of the bladder of indefinite size which was irregular, necrotic and covered with blood clots. Clear urine was seen coming from both ureteral openings. A small piece of tissue was taken for examination and was reported by the pathologists as inflammatory. On April 3 another cystoscopic examination was made and at that time the mass could be determined to be about 4 by 3 by 3 centimeters in size. It was ulcerated, irregular on the surface with the edges circumscribed and bled easily. The tumor was of an unusual type and in view of the

positive Kolmer reaction it was necessary to consider the possibility of a gumma. The patient was given an intensive course of salvarsin treatment and a third cystoscopic examination was made May 2. At this time the tumor gave the appearance of a Grade III epithelioma and its position made it favorable for resection. The unusual appearance of this growth gave the impression that it was a tumor of the urachus secondarily involving the bladder.

At operation a suprapubic incision was made exposing a growth in the space of Retzius. The tumor was about 4 centimeters in diameter and apparently originated in a persisting urachus at a point near the dome of the bladder and involving it. The mass with its bladder attachment together with about 1 centimeter of normal bladder wall around the periphery of the growth and the entire urachus were removed. It was necessary to open the peritoneum because of the posterior attachment. The peritoneum was closed and the bladder reconstructed with an inner row of plain catgut and an outer row of chromic catgut. The pathological examination showed a tumor of the lower end of the urachus with the involved bladder dome attached. The mass measured 4 by 3 by 2 centimeters and the urachus was 12 centimeters long. The greatest diameter of the urachus was 1.5 centimeters at its lower end and the least diameter at its tip was 5 millimeters. Microscopic examination revealed a squamous cell epithelioma of very malignant looking cells (Figs 7, 8, 9 and 10). The patient died 7 months after the operation from recurrence. Up to the time of his death there had been no urinary symptoms but there had been 6 local recurrences to the right of the midline and just above the symphysis. These recurrences gradually enlarged each to reach the size of a man's fist. There had been marked emaciation before death occurred but the patient had not permitted further treatment for the recurrences. No postmortem examination was permitted.

This case is of especial interest in view of the long history. Yet the clinical progress in general is the same as that in the case of the adenoma of the urachus reported and similar to the case reported by Schwarz. Here we have a 27 year history of abdominal pain, interval hæmaturia, with long periods of freedom, one of these periods being 12 years. In the 27 years he had three outstanding attacks of pain and hæmaturia, and in the few weeks prior to his examination the attacks were quite frequent. Clinically the positive Kolmer reaction threw some doubt upon the nature of the tumor but the subsequent operative findings and the microscopic examination established without doubt the pathological diagnosis. As in the other 2 cases which were

mentioned the cystoscopic picture of the bladder growth was unusual and the preoperative suggestion was made that the mass might be of extravescical origin. Metastases in malignancy of the urachus occur late in the disease while the spread of it is usually by direct extension and local recurrence, as in this case.

Khaum (5) reports Hoffman's case a man 28 years of age who had had a patent urachus since he was 3 years of age.

At the age of 27 patient noticed a hardness between the symphysis and the umbilicus movable but not tender. The mass had gradually enlarged and he had dysuria, weakness, loss of weight and had become emaciated. On examination the tumor which was about 10 centimeters long was found nodular, adherent to the umbilicus and painful. The urine contained a moderate amount of pus and epithelial cells. The mass became fluctuating and ruptured discharging a large amount of purulent bloody fluid but there was no change in the size of the tumor. The discharge contained many epithelial cells with pearl formation which subsequently proved to be squamous cell epithelioma.

Cullen mentions a similar case reported by Fisher. In this instance, a mass was at first thought to be an abscess and was operatively drained. Small balls of material were seen in the pus which proved to be squamous cell epithelioma. Both of the cases mentioned came to autopsy and in each instance the malignancy was found to be primary in the urachus.

Khaum says that true retention cysts of the urachus are rare because the mucous membrane of the urachus is similar to that of the bladder and has no definite secretory function. The same obscurity exists in regard to the exact origin of carcinoma. Schwarz says that he has never found glands in the urachus but he has found structures in the vortex and the trigonum bicaudati of the bladder which resembled gland formation. It occasionally happens that a carcinoma of the bladder is found which resembles the colloid carcinoma of the rectum. Rauenbusch in 10 years collected 65 cases of carcinoma of the bladder in males and of these, only 1 case was a colloid type of carcinoma while in only 10 cases of carcinoma of the bladder in females he found 1 instance of colloid carcinoma. How

can we account for the origin of carcinomata, especially of the colloid type in the bladder or urachus in which normally there are no glandular structures? If the mucous membrane of the urachus and the bladder arise from the same origin why are glands not found in each? It may be that by some process of metaplasia pseudo-gland formation is built up and malignancy superimposed upon them. The bladder and urachus belong embryologically close together and develop from the embryonic rectum the epithelial coat of which they carry with them. Therefore it is not entirely strange that occasionally gland formation may exist and give rise to a malignant process. Another factor which should be considered is the close proximity of the vitelline duct to the urachus during development. This causes us to wonder if there could be any connection between these two structures in the production of neoplastic growths.

CASE 7 Mr J G a farmer of 68 came because of stomach trouble. The family and past histories were negative. For years the patient had complained of belching gas and some constipation. Three months ago he noticed an irritation about the umbilicus which became reddened hard and at times slightly tender. There were occasional sharp pains in this region but they were never severe. Local treatment had been tried but without relief. The general physical examination was negative save for an ulcerated area about the umbilicus. Urine blood and Wassermann examinations were negative. A clinical diagnosis was made of infected umbilicus.

At operation an elliptical incision was made to include the portion of the umbilicus above the aponeurosis. The aponeurosis was then split and there was found to be a thickened mass of tissue immediately below the linea alba. This mass was about the diameter of a 25-cent piece and the tissue looked malignant. There was no evidence of metastasis or of direct extension of the growth. The pathological specimen of the umbilicus and surrounding tissues removed measured 8 by 8 by 2 centimeters. The skin was markedly thickened being 1.5 centimeters thick. It was very hard and fibrous with gross bands of connective tissue throughout the entire mass.

Sections (Figs 11 and 12) taken from the tumor showed adenocarcinoma and from the location and arrangement of the growth it appeared that it originated in the urachus and not in the umbilicus. The patient received three radium treatments over the operative site the dosage totaling 7,656 milligram hours. In about 3 months there were local

recurrences. The patient refused further treatment and died September 20, 1931. No postmortem examination was permitted.

Because of the location of this tumor and the fact that the tumor was definitely identified as a part of the urachus which could be easily seen it seems that this mass originated within the urachus. It did originate near the umbilicus and discharge through a sinus at the navel and this fact seems against including it as a urachal tumor.

It is more common to find the tumors of the urachus in the lower half and as Cullen says, usually in the lower third. Figure 11 shows a layer of stratified epithelial cells with a fairly thick layer of cornified epithelium in the outer portion. Figure 12 shows areas of undifferentiated epithelial cells in glandular formation invading the underlying tissues. It is impossible to say whether this was primarily a squamous cell epithelioma of the umbilicus which extended into the tissues below and by a process of metaplasia gave the picture of an adenocarcinoma, or primarily an adenocarcinoma of the urachus with a change in its pathological picture as it extended to the cutaneous tissues. This typifies that group of cases in which a fine line of distinction cannot be drawn between tumors of the umbilicus and those of the upper part of the urachus.

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SECTION OF THE LEFT VAGUS FOR RELIEF OF ASTHMA¹

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VAGUS section in bronchial asthma is a new and little tried procedure. It is desirable therefore to put on record all instances in which this operation is performed in order that a true valuation of the procedure may be reached. For this reason a case is reported in which vagus section was followed by only slight improvement.

The patient who is the subject of this report is a man 63 years old. His past medical history is negative for any other manifestation of hypersensitivity but a niece is asthmatic. He had been perfectly well until March 1923, when in the course of an attack of acute bronchitis he suddenly developed a wheezing dyspnea that persisted and after several months forced him to give up his work and go to bed. At first the dyspnea was fairly constant but in September 1923 6 months after the onset it began to be worse in paroxysms. These attacks came several times a day with no obvious relation to any special cause and could be relieved by injections of adrenalin. At this time he was admitted to a hospital where he remained for 7 months. Various examinations were made and the usual measures for relief attempted but without helping the patient whose condition grew gradually worse. On April 19 1924 he was transferred to the Medical Division of the Hospital of the University of Pennsylvania.

Examination showed a rather emaciated cyanotic bedridden individual with labored wheezing respiration and frequent but unproductive cough. The nose and throat were congested and several decayed snags of teeth were present in the lower jaw. The chest was markedly emphysematous. The heart was large and the sounds feeble. The blood pressure was 216 systolic and 72 diastolic. There was a moderate secondary anemia with 70 per cent of hemoglobin and the leucocyte count varied from ten to sixteen thousand with eosinophiles ranging from none to 6 per cent. The blood Wassermann was negative. The urine contained traces of albumin and varying numbers of hyaline casts but the specific gravity had a normal range and tests for renal function gave normal results.

The usual skin tests for hypersensitiveness were performed using the inhaled substances—feathers, animal hair, pollens,orris root and house dust—and also the foods included in his diet. All reacted negatively, some of them on two occasions.

Röntgen ray examination showed a clouding of the ethmoid sinuses on both sides and some abscessed teeth. Attention was therefore first directed to these foci of infection. Thorough operative drain-

age of the ethmoid region was promptly followed by complete relief from paroxysms for 3 days. When these returned they were believed to be due to blocked drainage. A reopening of the sinuses was again followed by 2 days freedom from asthma. A third examination showed no local explanation for the recurrence of trouble but the cocaineization of the nose at this time again relieved the patient for a day or so. Later this measure also failed. Vaccines prepared from the sinus pus and from the sputum were used but gave no relief nor could positive skin reactions to bacterial proteins be obtained. The latter was attempted by the intracutaneous injection of heavy suspensions in salt solution of killed bacteria: the strains recovered from the sputum (a hemolytic streptococcus, a non hemolytic streptococcus and micrococcus catarrhalis) being used separately.

The attacks of dyspnea in the course of the next 2 months became gradually more frequent, adrenalin alone gave less and less relief and had to be supplemented by pituitrin and frequently by morphine. At this juncture sodium iodide was given intravenously using 10 cubic centimeters of 1 per cent solution and for a few days it helped considerably. The attacks were less frequent and yielded more readily to adrenalin.

But again the relief was only transitory so that early in July 1924 he was requiring adrenalin injections at intervals of 1 hour or less. It was at this time that in desperation we considered the possibility of surgical relief.

The operative treatment of bronchial asthma has received considerable attention in Europe in the past 2 years. Section of the cervical sympathetic was the first operative procedure proposed. In July 1923 Kuemmel (9) reported his results from unilateral cervical sympathectomy in four asthmatics ranging in age from 23 to 65 years. One case was a failure but 3 patients were said to be completely relieved. Kaess (6) in 1924 reported 5 cases so treated that they were all still relieved after periods of from 3 weeks to 4 months. Floercken (2) performed this same operation on 4 patients, 3 of whom at the time of reporting were still relieved after periods of 3 weeks to 5 months, while the fourth had temporary relief and then a recurrence of trouble. Von Genssich (10) did a left cervical sympathectomy in a man 64 years old in whom all other

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forms of treatment had failed. For 2 weeks the patient was without asthma, then the attacks recurred with great severity and at the request of the patient the right side was also operated upon. The attacks were now reduced in frequency to one daily. Two months later the costal cartilages on the right side from the second to the fifth inclusive were resected with subsequent relief from asthma.

On the other hand, Jungmann and Bruening (5) reported 3 cases of unilateral cervical sympathectomy with no relief in 1 instance and relief for only a few days in the other 2.

Just why sympathectomy should relieve bronchial asthma has been the subject of much discussion. Kuemmell (9) believes that there is such an interweaving of vagus and sympathetic fibers and consequently of vagal and sympathetic function that vagus and sympathetic should not be considered as clearly separated in an anatomical or physiological sense. Cutting the vagus he considers dangerous but in cutting the sympathetic he believes that he divides enough vagus fibers to be of benefit. Glaser (4) on the other hand believes that sympathectomy divides the centripetal fibers of a reflex arc. This opinion is shared by Kaess (6) and Moravitz (cited by Glaser). It has also been suggested that there is a lack of equilibrium between vagus and sympathetic in asthmatics and to this cause Claude (1) attributes the contradictory results obtained when the tests of Eppinger and Hess for vagotonia and sympathicotonia are applied to asthmatics.

But sympathectomy is a rather difficult procedure and needs to be done under general anesthesia for which we deemed our patient unsuitable. This together with the uncertainty as to underlying principles and results of sympathectomy led us to consider vagus section. If bronchospasm is a factor in the mechanism of asthma then division of the motor nerve supply of the bronchial musculature would have a logical basis. Kappis (7) in December 1923 reported both unilateral and bilateral section of the cervical cardiac branches of the vagus for the relief of angina pectoris. In May 1924 Frey (3) in an article calling attention to the possible dangers of section of the nerves innervating the heart

mentioned the fact that vagal section has been performed by Kappis, and had apparently been mentioned by Kappis at some medical meeting shortly before. We have, however, been unable to find a reference to the early work of Kappis, and he gives no journal reference of it in his later paper. However, we did know that the operation had been successfully performed, our next concern was as to which vagus to cut. Section of the left vagus would involve recurrent laryngeal paralysis. On the other hand, the cardiologist told us that section of the right vagus, because of its greater part in the innervation of the heart, might cause trouble from the standpoint of that organ particularly so in our patient who undoubtedly had myocardial weakness and a tachycardia ranging between 96 and 120.

We chose, therefore, left vagus section with its vocal cord paralysis in preference to a possible fatality from right vagus section. The nature of the operation and its possible consequences were explained to the patient and he gladly consented to try anything that might possibly give relief.

Accordingly, on July 19, 1924, the left vagus was cut under local anesthesia by Dr. I. S. Ravdin of the Surgical Division of the University Hospital. There was no striking immediate effect. In the 2 weeks that followed however, the asthmatic paroxysms became somewhat less severe and also less frequent, so that the patient required adrenalin injections at intervals of from 6 to 18 hours only. The pulse rate to our surprise was not at all affected at the time of operation, and thereafter gradually fell in the course of 2 weeks to a range between 76 and 100. Figure 1 gives an abbreviated record of pulse and respiration rate during the week before and 2 weeks after the operation.

The blood pressure likewise showed no change but continued undisturbed around 120 systolic and 70 diastolic. An electrocardiographic tracing made some weeks after operation showed simple tachycardia and a P-R interval of 0.14 to 0.15 seconds. The QRS complexes were of low voltage indicating a poor functional state of ventricular muscle.

There was no further improvement in the patient's condition. While he was no longer

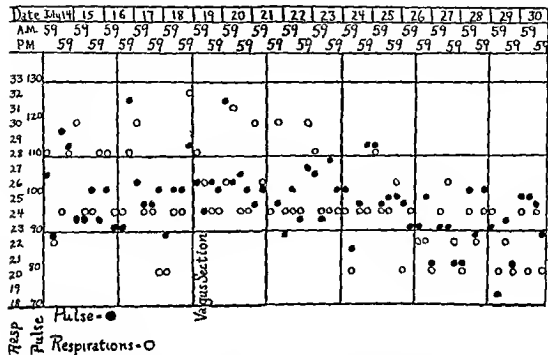


Fig. 1. Chart showing abbreviated record of pulse and respiration rate during the week before and a weeks after operation

bed fast and gained 5 pounds in weight, he continued to have dyspnea on slight exertion and from one to three paroxysms of asthma daily. Vaccines, intravenous sodium iodide, local applications through the bronchoscope failed as before to give relief. A week's stay in a room supplied with dust free washed air seemed at first to lessen the severity of the attacks but not permanently. The vocal cord paralysis interfered with coughing to some extent and the patient's voice was little more than a hoarse whisper. On January 8, 1925, he was discharged to his home but 2 months later he was readmitted to another hospital because of difficulty with adrenalin hypodermics. His present condition is practically the same as when he left our wards.

Bronchoscopic findings after the vagus section as described by Dr. Gabriel Tucker of the Bronchoscopic Clinic of the University Hospital are of interest. The tracheobronchial movements on the right side were normal; on the left there was more limited opening and

closing of the bronchus. The left bronchus did not collapse on efforts or coughing as was the case on the right side. The secretion in both main bronchi seemed about the same in amount and character. There was apparently no difference on the two sides in response to stimuli as manifested by production of cough. Five months after the operation the bronchi on the right side seemed to open more widely on inspiration and to show greater excursion in closing on expiration and on cough than did those on the left, although motion was very good on the left side. Left vagus section had apparently not materially reduced the motor nerve supply of the left bronchial tree.

In September, 1924, 2 months after our patient had been operated on, there appeared an article by Kappis (7) in which he described some of his experiences with vagus section. He first performed the operation in January, 1925, cutting the right vagus below the level at which the recurrent laryngeal branch is given off. The results were variable

some good and some bad. No harmful effects on the heart were noted. One patient died as a result of injury to the subclavian artery at operation. In one patient a man 64 years old section of the right vagus gave some relief from asthma but there was considerable unilateral sweating. Kappis then did a sympathetomy on the same side, this was followed by a return of asthma as severe as it had ever been.

In his discussion of the indications for operation Kappis emphasizes the fact that nerve section in asthma must be looked on as a last resort and with this we heartily agree. As to whether vagus or sympathetic is to be cut, he finds it difficult to say which will help. In an attempt to answer this question he injects either the right vagus or the left sympathetic with novocain and later operates according to the results obtained. He advises against cutting both nerves on the same side, and, of course against cutting both vagi or both sympathetics. He has noticed some increase of bronchial secretion after vagus section. This was not the case in our patient.

SUMMARY

The history of a patient is reported in whom as a last resort the left vagus was cut for the relief of asthma. The operation was followed by only slight improvement. No harmful effects on heart action were observed. Bron-

choscopic examination showed diminished but not lost bronchial motility on the affected side. The subject of the operative treatment of asthma is briefly reviewed. No conclusions are drawn as to the value of vagus section in asthma on the basis of this one case. In view of the experience of Kappis however, it would seem that right vagus section below the level of origin of the recurrent laryngeal nerve may be safely performed and is, therefore, preferable to cutting the left vagus.

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ECTOPIC URETERAL OPENINGS

SURGICAL SIGNIFICANCE AND TREATMENT

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CONGENITAL malformations of the uropoietic system are of interest both to the student of embryology and to the clinician, to the latter particularly because of the very confusing symptomatology that may be presented for diagnosis and the difficulties that may present themselves in determining the proper procedure for correction of the deformity. Practically all such cases require surgical intervention for relief, if symptoms are present that cause distress or discomfort. Present day methods of urological diagnosis permit such accurate and detailed determination of the conditions present that many of the details of an anatomical anomaly of the kidneys or ureters can be demonstrated in the living while formerly such details were available only at autopsy. With such detailed information available the decision as to the surgical procedure applicable in any given case is greatly facilitated.

Kelly and Burnam classify anomalous ureteral terminations as follows:

1. In the male genito urinary apparatus (1) in the bladder (2) in the urethra (3) in the seminal vesicle, vas deferens ejaculatory duct or prostate.

2. In the female genito urinary apparatus (1) in the urethra (2) in the vagina (3) in the vestibule of the vagina (4) in Gaertner's canal, (5) in the uterus or tubes.

3. In the bowel (1) in the rectum and cloaca (2) in the intestines (3) in the urachus and amniotic cavity.

4. In cases of congenital absence of the bladder (1) in the urethra (2) in the vestibule of the vagina.

5. Blind endings.

This paper comprises a study of two patients under the author's observation each with an ectopic opening of a supernumerary ureter and a consideration of cases of single and supernumerary ureters with ectopic openings reported in literature but including only (1) in

the male ectopic openings directly into the urethra or indirectly into the urethra through the seminal vesicle vas deferens ejaculatory duct or prostate and (2) in the female ectopic openings into the urethra or vagina or on the external genitals. The anomalies included in this grouping comprise a definite clinical entity and while the symptoms differ to some extent in the male and female the surgical considerations are practically the same.

The maldevelopments of the uropoietic system exemplified by supernumerary ureters and ectopic openings may be better understood through a brief study of the embryonal development of these structures. Variations in the number of ureters arise through maldevelopment of the ureteral anlagen before the ascent of the kidney out of the pelvis. Early in the life of the embryo the cloaca represents both the future rectum and the future bladder. It gradually becomes divided by a vertical fold into two compartments with the anterior of these the allantois and the primitive excretory ducts are connected while the posterior develops into the rectum.

Entering the cloaca from the dorsal aspect are the two wolffian ducts which furnish the parent structures of the renal pelvis and the ureters. The wolffian duct originally developed from the pronephros is throughout the greater part of its existence the excretory duct of the wolffian body or mesonephros. From these two primitive structures are developed most of the genito urinary system.

The ureter arises as a process or evagination from the hind wall of the lower end of the wolffian duct. The distal portion of this anlage divides into two branches (representing the primary division of the pelvis into two major calyces) which grow into the developing kidney blastema. Each branch divides again dichotomously and this process of branching is repeated until the calyces and straight uriniferous tubules are produced. The evagina-

tion of the ureteral anlagen dates back to the third or fourth week of embryonal life, before the lower portion of the duct becomes widened and drawn into the urogenital sinus.

Of the several theories that have been advanced to explain the formation of double ureters one of the most acceptable is that, instead of a single evagination from the wolffian duct there are two or more anlagen and each of these develops into a separate ureter with a separate implantation into the developing kidney blastema. This theory would explain the formation of a complete ureteral duplication but not of an incomplete one. The development of the latter type of anomaly may be explained by considering a precocious branching of the original evagination before the distal ends became embedded in the nephrogenic tissue the point of juncture of the two ureters depending upon the period of embryonic development at which the division of the ureteral anlage occurred.

Through expansion of the lateral portion of the allantois the lower end of the wolffian duct becomes dilated and the lower ureter is the first to reach the allantois thus determining the site of entrance to the bladder which usually is at the normal insertion of a single ureter. The wolffian duct carrying the upper ureter with it, shifts with the urogenital sinus in a downward direction between the allantois and the rectum until the second ureter also becomes implanted in the bladder. Thus the ureter from the upper portion of the kidney is always inserted at a point lower than the insertion of the ureter from the lower renal pelvis. If the two ureters are liberated in close succession they will be found close together in the bladder if a longer interval prevails they will be further apart even to the extent of the upper ureter opening below the bladder. Meanwhile the kidney ascends from the pelvis into the lumbar region—the ureteral tube lengthening as the kidney ascends.

Variations in position of the lower end of the ureter. At first the ureter opens into the lower end of the wolffian duct but later becomes detached from the duct and attached to the allantois and thus to the future bladder. But if the ureter does not separate from the wolffian duct but accompanies that canal in

its downward course there may result an abnormal opening of the ureter into the vas deferens seminal vesicle or ejaculatory duct in the male, or into the rudimentary Gartner's duct in the female—these organs being derived from the wolffian duct. If the ureter after the sixth week of embryonic life still remains attached to the duct the ureteral openings may be found in the sinus urogenitalis and the organs developing out of this, namely in the upper portion of the urethra or the prostate in the male in the urethra or the vestibule of the vagina in the female. If the ureter does not remain isolated from the Muellerian tube in the female, the opening may be in the uterus or in the vagina.

Thus an otherwise normal ureter may have an ectopic opening, a supernumerary ureter may empty into the bladder beneath the normal ureteral opening, a supernumerary ureter may have an ectopic opening while the normal ureter ends in the bladder, both normal and supernumerary ureters may have ectopic openings or ureters separate at the kidney may join to form a single tube before reaching the bladder and any combination of these abnormalities may co exist when there is bilateral involvement.

SYMPTOMS

In the female the type of symptoms is governed to a large extent by the site of the ectopic opening. When the opening is on the vulva or about the external meatus or in the vagina the symptomatology is definite and characteristic. From birth there is constant dribbling of urine beyond control and without sensation in addition to which urine is voided at normal intervals in normal amounts and in response to the normal impulse of a filled bladder with complete relief on completion of the act.

The history alone should lead to a ready diagnosis but apparently the condition goes unrecognized for years in most instances the patient suffering keenly from the humiliating deformity and subjected to very definite social and economic handicaps. Being congenital the conditions naturally are present from birth, but appreciation of the presence of an abnormal condition occurs when wetting continues

and persists beyond the age when the normal child has learned to control the bladder functions

If the ectopic opening is in the vagina or about the external meatus, it can usually be identified, if searched for carefully, and a small ureteral catheter introduced. When this is possible the elicitation of the further details entails no great technical difficulties. A word of caution is here necessary. If in the course of an examination the bladder is catheterized or a speculum is introduced into the vagina the leakage from the ectopic opening may cease entirely as the pressure of the catheter in the urethra or the speculum in the vagina may be sufficient to completely block off the flow of urine from the supernumerary ureter.

If the vagina is tamponed with pledgets of cotton and methylene blue is given by mouth or indigo carmine injected subcutaneously or intravenously the dye may be eliminated in the urine from the anomalous kidney and the stain on the cotton may be a very considerable aid in localizing the ectopic opening.

If the ectopic opening is in the urethra the symptoms are dependent upon the course of the ureter. If the latter enters the bladder wall and passes downward beneath the vesical and urethral mucosa the constriction of the musculature at the bladder outlet may exert sufficient pressure to prevent the escape of urine from the ureter except during the act of micturition under which conditions no symptoms would be noticed by the patient and the anomaly would remain unnoticed.

However when the course of the ureter is such that it escapes the constricting influence of the vesical outlet constant leakage occurs exactly the same as when the opening is in the vagina or near the external meatus.

Furniss reports one case in which the opening was not identified either before or after operation although the diagnosis was definitely established at the operation and the incontinence cured.

When this difficulty of identification and localization of the opening obtains suggestive data may be obtained by careful cystoscopic and pyelographic examination since the pelvis and ureter communicating with the bladder on the side of the supernumerary ureter may be

found to differ in size shape and position from the pelvis of the opposite side and thus warrant surgical exploration for more detailed examination.

In the male the condition usually exists unrecognized unless the existing hydronephrosis is complicated by infection when increased temperature, pain swelling etc. will be noted.

In the male but two cases have been diagnosed during life. Chute recognizing one case during an operation and Day making a complete pre operative diagnosis. Erlach, Handl, Mesley and Veau Obici, and Rech each report autopsy findings in male subjects in whom no symptoms referable to a urinary anomaly had been noted during life.

Peacock reports an autopsy on a male child who had been well until he was 6 months old except that he never urinated freely. From then until his death at 9 months he lost in weight from 24 to 11 pounds. During this period the abdomen showed increasing distention and was hard and tender. The urine looked like milk and had an offensive odor. Convulsions occurred a few hours before death.

Day reports a young man free from symptoms until several hours after wrenching his back in a fall when a sudden sharp pain was noticed in the left lumbar region. The urine became blood tinged and later was loaded with pus. Fever was present for a few days and during the ensuing month he lost 15 pounds in weight. On admission to the hospital he complained of malaise inability to work dull pain in the left upper abdomen and discomfort in the back.

Chute's patient had no sign of prostatic or penurethral infection but could squirt out several drops of pus from the urethra by straining after the bladder had been emptied. Pain occurred in the left side when a retention catheter was placed in the bladder the pressure of the catheter apparently preventing the escape of pus through the ectopic ureter.

Some variations from the characteristic symptoms have been noted in the female.

Hunner's patient suffered for 7 weeks from symptoms simulating stone in the right ureter but had never noticed any incontinence. The kidney was found to be replaced by a pyonephrotic sac.

Judd reports a woman 21 years old with diurnal enuresis all her life and nocturnal enuresis when younger but not during her recent years. The dribbling in this instance was not constant but occurred only when she stood or became excited. Three attacks of sharp colic like pain in the right side of the abdomen, each attack lasting 2 or 3 days had been diagnosed as appendicitis.

Kelly and Burnam report one case in which the supernumerary ureter was almost functional, the discharge occurring only at intervals but the patient suffered much pain at the neck of the bladder.

Juyara reports a woman entirely cured after operation who for years had a small ulcer on the right side of the meatus from which clear fluid escaped. There was also tumefaction of the entire vulva and the condition had been considered a chronic tuberculous lesion because of a tuberculous trait in the family.

Kakuschkin's patient a woman of 31 had suffered all her life from a typical incontinence. One year after a confinement fever occurred suddenly with the formation of a tumor in the right side of the abdomen and retention of urine. The fever subsided and the incontinence was replaced by a purulent leucorrhœa, the pus escaping from the ectopic ureteral opening on the anterior vaginal wall. The change in the character of the secretion from the ectopic opening was evidently due to the occurrence of the pyelonephritis.

Kallmann's patient had been incontinent from infancy but continent for some time preceding operation. The supernumerary ureter ended in a blind sac behind the bladder wall. An ectopic opening was not found. Kallman concluding that in the absence of secretion the minute orifice would escape even a very detailed and careful examination. This is the only instance found in which the incontinence ceased spontaneously and it is interesting to note that a pyonephrosis followed the spontaneous closing of the ectopic opening.

Knoepfelmacher reports an autopsy on a child of 4 who died from a condition diagnosed as an extrapontoneal abscess. The upper greatly dilated portion of the ureter was filled with pus while the lower segment of the ureter was contracted.

Kolisko reports an autopsy on a woman 21 years old who died from causes not in any way connected with the malformation. No symptoms referable to the kidney condition had been noted in her life. The right supernumerary ureter entered the bladder wall with the normal ureter but instead of opening into the bladder cavity passed down in the vesicle wall as a thin walled sac, to open into the urethra almost at the external meatus. The escape of urine from the ectopic opening was controlled by the sphincteric action of the bladder outlet.

Link reports a discharge of pus from the vagina with later pus from the rectum evidently the result of an inflammatory perforation.

Mueller quoting Stolz reports a girl of 8 who subsequent to a fall developed a tumor of the left renal region pressure on which caused pus to flow from the urethra.

The patient of Samuel's Kearns and Sachs a woman of 29 years, had spasm and rigidity of the entire right rectus and tenderness in the right flank and right lower abdomen but no tenderness in the costovertebral angle.

Pregnancy seems to have exerted some influence in the symptomatology of some patients. Fromme reports the case of a woman of 25 well until 1 year previously when the discharge of purulent urine in the vagina began after a normal delivery. Urination was otherwise normal. J. P. Hartmann reports a woman of 49 incontinent for 24 years since her third normal labor. Previous to that she had been incontinent only when running or on other exertion. Hayward's case was incontinent from infancy but the symptoms became much worse after the birth of a child and were always aggravated by coughing or other exertion. Jaffe reports a woman of 22 with typical incontinence for 8 months following her last confinement pain in the left lower abdomen and tenderness in the left adnexa. Judd reports a patient 48 years old with characteristic incontinence until at the age of 18 the ectopic ureter was implanted into the bladder with complete relief (reported by Maxson). Patient remained well after this for several years until about the middle of her first gestation when the incontinence recurred and

was especially noticeable when she was in the upright position. During the second pregnancy 3 years later there was a greater degree of incontinence.

In these cases in which the incontinence first appeared after childbirth it is apparent that a supernumerary ureter with a blind ending had existed and some trauma incident to the confinement had resulted in rupture of the ureterovaginal septum and the establishment of a permanent fistula.

TREATMENT

The choice of operation necessitates a study of all the factors that may be present in each individual case. The object of surgical intervention is the relief of the patient's symptoms with the minimum interference with kidney function. With a single ureter from the involved kidney the choice rests between a nephrectomy and the diversion of the urine from the involved kidney into the bladder through an implantation into that organ of the ectopic ureter. Here the choice will depend upon the functional activity of the kidney, the amount of infection present, and the presence or absence of sacculization and dilatation in the course of the ureter.

It does not seem that the surgeon would be justified in ligating a single ectopic ureter except under most unusual circumstances. If considerable infection is present or a kidney shows poor functional ability or the ureter is sacculated, dilated or tortuous a nephrectomy would be indicated, provided an examination of the other kidney revealed no contra-indications.

If the involved kidney shows little or no infection and is capable of good function and the ureter is fairly uniform in caliber, the implantation of the ureter into the bladder may be attempted. However it is well to remember that the continuous discharge of even a mildly infected urine into the bladder may cause a cystitis intractable to treatment and with symptoms making the patient's condition worse than before relief was attempted.

With a supernumerary ectopic ureter a wider choice is available. Implantation of the supernumerary ureter involves the same consideration of infection, function of the

supernumerary portion of the kidney, and the condition of the supernumerary ureter. If the supernumerary kidney is a separate organ a true third kidney removal is clearly indicated with either a total or partial resection of the anomalous ureter. Two such cases are reported—one by Israel and the other by Samuel's Kearns and Sachs.

When both ureters drain a common pelvis ligation or ligation and resection of the ectopic duct provides a comparatively easy solution. However no report of such a case has been found. The closest approach is reported by Juvara who found that the supernumerary ectopic ureter arose from the normal ureter just below the right pelvis. Ligation and resection of the ectopic duct was easily accomplished and resulted in a complete cure.

Resections of the supernumerary portion of the kidney are reported by Furness, Kakuschkin and Josephson, the latter presenting a true heminephrectomy in which a resection was made through kidney parenchyma. The feasibility of a heminephrectomy depends to a very considerable extent upon the arrangement of the blood supply to the kidney.

In the author's first case a single vascular pedicle was found to enter the supernumerary portion of the kidney. When this condition exists resection of the upper portion of the kidney involving as it does the removal of the entire blood supply is absolutely not feasible. Successful resection of a portion of the kidney is absolutely dependent on an adequate blood supply to the remaining portion and when doubt exists as to its adequacy a complete nephrectomy is safer.

Much information as to the size, shape and position of the normal and supernumerary ureters and pelves and the condition of the respective portions of the kidney can be obtained before operation by cystoscopy and pyelography. No idea of the vascular supply and formation, however, is available until the kidney has been exposed at which time the decision as to which operation is indicated, partial or total nephrectomy, will have to be made.

Kallmann in reporting his cases states that resection of the upper supernumerary section of the kidney could have been performed but

for the reason that large blood vessels leading to the lower segment had been divided before the condition was fully recognized and the nephrectomy had to be completed

Ligation of ureter Six ligations are reported. In four the ureter was exposed through an abdominal extraperitoneal approach and in the other two cases through the vagina.

Nove Josserrand reports a case in which a urinary leakage occurred 5 days after a vaginal dissection and ligation of the ectopic ureter necessitating a secondary nephrectomy. The remaining five cases are reported as successful. Despite these favorable reports the writer questions the advisability of ligation in any case and is inclined to condemn it in the presence of infection in either the supernumerary or normal section of the kidney.

Anastomosis of pelves Stammier and Kummel and Graff report similar cases in which following ligation and resection of the right supernumerary ureter, a connection was successfully established between the two pelves after the manner of an entero anastomosis. In each instance the left supernumerary ureter was ligated and resected the ureters and pelves being found too small to permit a plastic joining.

Ureteral anastomosis Several instances are noted in which consideration was given to the possibility of joining the supernumerary and normal ureters but no report of such an operation has been discovered. When such an operation has been considered the large size of the supernumerary as compared with the normal ureter has apparently caused the operator to decide against attempting an anastomosis. In the author's two cases the disproportionately large supernumerary ureters also seemed to render such a procedure unjustifiable were the other conditions favorable.

If a case presents a large normal and a small supernumerary ureter an anastomosis of the two ureters might be feasible but again the presence of infection in the cephalic segment with the possibility of an ensuing cystitis from the infected urine should cause a grave doubt as to the advisability of this operation.

Transurethral operations Three cases in which operative procedure through the ure-

thra resulted in cures have been reported. Bois introduced a tenatome into the ectopic ureter and guided by a grooved catheter introduced through the urethra cut through into the bladder. The fistula thus established was kept open by passing a sound through it at intervals. At the time of reporting this case it was planned to close the ectopic opening by freshening and suturing the edges.

Hunner fastened a rubber glove finger on a ureteral catheter and then introduced this into the right ectopic ureter. The glove finger was distended with air pumped through the catheter, the distention causing a marked prominence in the vagina but not in the bladder (viewed through an endoscope) until by finger pressure in the vagina the bladder prominence was brought out. A cautery blade introduced through the endoscope was used to establish a vesico ureteral opening. This opening was probed from time to time to maintain a permanent fistula. Eighteen months later the patient is reported free of symptoms.

Wollfler (reported by Schwarz) in a girl of 12 by means of an instrument resembling Dupuytren's intestinal clamps, aimed to cause a necrosis of the wall of the bladder and the aberrant ureter. After a careful preliminary dilatation of the urethra one blade of the instrument was introduced into the bladder the other blade introduced into the ectopic ureter and the blades locked. On removal 6 days later a thin necrotic membrane was found between its blades. On digital examination 6 weeks later a communicating orifice 1.5 centimeters long joined the two cavities. Eighteen months later the vesical sphincter was found to be abnormally relaxed and a twisting of the urethra according to the method of Gersuny was performed. After this the patient was able to retain urine up to 6 hours.

Trans-escial suprapubic anastomosis Tauffer through a trans-escial suprapubic approach opened the bladder and cut down on a buttoned sound introduced into the aberrant ureter establishing a connection between the bladder and the supernumerary ureter. No suturing was necessary so well fixed was the ureter to the bladder wall. This patient made an uncomplicated recovery to cure.

Baum through the same type of approach, cut through the posterior wall of the bladder into the aberrant ureter and sutured the edges of bladder and ureter. The incontinence was cured but a vesical calculus formed and was removed some months later.

Implantation. Implantation of the super numerary or single ureter into the bladder through a vaginal approach is reported in 18 cases through a suprapubic approach in 8 cases and a subpubic approach in 1 case making a total of 27 cases thus treated.

In the light of our present day knowledge there would seem to be no excuse for the sub pubic operation. Colzi reports one such operation in a girl of 15 years. A curved incision was made with its convexity upward through the soft parts close to the pubic arch and the vagina and urethra retracted downward. The bladder and ureter were exposed but because of the limited space the lower border of the pubic arch was chiseled off and the ureter was then implanted into the vagina. The patient is reported cured.

Vaginal implantation. Albarran made a vaginal approach and sutured the edges of a wide anastomosis between the bladder and the supernumerary ureter successfully after a previous suprapubic anastomosis had failed.

Baker reports section and implantation of the end of the ureter into the bladder but 2 months later could not pass a probe into the ureter. Baker also reports the attempt of Dr Emmett to form a canal by enfolding the vaginal mucosa from a position high in the vagina where the ectopic ureter opened to a point where a junction could be made with the bladder. This attempt was not successful and this procedure would not be considered.

Benckiser performed a two stage operation. The first established a connection between the bladder and the supernumerary left ureter followed 4 weeks later by the closing of the vaginal portion of the fistula. Result cured.

Davenport reports an implantation of a dilated right ureter followed by a secondary operation to close the persisting fistula. Cured.

Fronme reports an implantation followed by a cure.

Furness reports an unsuccessful anastomosis between the bladder and ureter, the incontinence reappearing 4 days after the operation.

At a second operation the lower end of the ureter was drawn into the bladder by traction upon a suture introduced through the urethra and the ureter was sutured to the bladder wall. The incontinence ceased but 3 weeks later after the intravenous use of indigo carmine none could be seen coming from the newly formed ureteral orifice in the bladder nor could the supernumerary ureter be catheterized.

J. P. Hartmann reports a successful implantation in a woman incontinent after the birth of a child.

Job Hartman reports a successful implantation of the lower end of a supernumerary ureter into the bladder.

Hohmeier reports a successful implantation of a right supernumerary ureter.

Jaffe reports one successful implantation of a right supernumerary ureter.

Kelly and Burnam report two cases cured by a longitudinal incision through the anterior vaginal wall and the posterior or approximate wall of the supernumerary ureter followed by another like incision through the anterior wall of the ureter into the bladder with careful approximation of the edges of bladder and ureter after which the primary incision through the vagina was closed.

McArthur successfully implanted the cut end of a ureter into the bladder after another surgeon at a previous operation had failed to control the incontinence.

Maxson reports a case in which the ureter was cut across and the end drawn into the bladder by traction on a suture introduced through the urethra. The ureter then being fixed to the bladder by sutures. This case is reported cured but a recurrence of the incontinence several years later after the birth of a child is reported by Judd.

Olshausen reports a case in which the supernumerary ureter was first sutured into the urethra. This operation was followed by fever and pain in the right side. At a second operation the ureter was implanted into the bladder but three additional plastic operations were necessary to cure the incontinence. The patient is reported entirely well 5 years after operation.

Pieri reports the implantation of a right ectopic ureter followed by fever and pain along the course of the ureter. A vaginal incision was made and a large amount of purulent urine released. The ureter was again implanted into the bladder, but a month later a nephrectomy was necessary.

Suprapubic implantations. Reports of 8 cases so treated were found. Albarran through a transverse hypogastric incision exposed the supernumerary ureter and sutured the vesical and ureteral edges. His case was unsuccessful, the incontinence recurring 1 week later.

Christofolini divided the ureter and ligated the distal end. The proximal end was then implanted into the vertex of the bladder. The patient was cured.

Desnos successfully implanted the proximal end of the divided ureter into the bladder.

Hayward made a suprapubic retroperitoneal exposure and implanted the right supernumerary ureter into the bladder with a successful result.

Judd through a right rectus incision and an extraperitoneal approach found a greatly thickened and dilated ureter and implanted the proximal end into the bladder with the decision to do a nephrectomy later if necessary. Two days later there was considerable pain in the region of the right kidney and pus was found in the urine. Two ureteral catheters were passed to the right pelvis and continuous pelvic lavage instituted. This patient is reported free from symptoms 18 months after operation.

Kuettner implanted the ureter into the bladder in an oblique direction and reports the case cured.

Schaefer successfully implanted a supernumerary ureter into the bladder through a suprapubic extraperitoneal approach.

Westhoff in a girl of 7 considering the parts too small to permit a successful vaginal approach used a suprapubic extraperitoneal approach. An ectopic not supernumerary ureter (left) was implanted into the bladder and the patient was reported cured 1 year after operation.

Nephrectomy while the safest and simplest operation from the standpoint of its immediate effect upon the recovery of the patient neces-

sarily entails a consideration of all the existing factors before its choice as the operation of election. Nevertheless its performance should cause no hesitation if the general condition of the patient including the demonstration of a normally functioning opposite kidney warrants it and anatomical and pathological conditions present seem to preclude the success of more conservative measures.

Chute removed an entirely destroyed left kidney. There was complete duplication of the pelvis and ureters and separate arterial supply to each portion of the kidney. Some years later a cystogram showed the remains or stump of the dilated ureter appearing as a diverticulum the size of a small sausage and evidently the source of very foul urine. With the exception of Day's case this is the only report of an operation on a male patient.

Day removed the left kidney which was immensely dilated, sacculated and filled with pus. A portion of the ureter (the lower end of which opened into the posterior urethra) was removed at the same operation through a Gibson's incision. A secondary operation was necessary for the removal of the extreme lower portion of the ureter. The patient was cured. This is the only case found reported in which a complete and accurate pre-operative diagnosis was made in a male.

Successful nephrectomies are reported by Kakuschkin, Kallmann, Linck, Mueller, quoting Stolz and Nemenoff. These with the author's two cases, make a total of nine primary nephrectomies.

In the only instance in which the presence or absence of infection in the supernumerary portion of the kidney is emphasized, Nemenoff reports a case operated on by Professor Schirchow who decided against implantation of the infected ureter into the bladder and resorted to a nephrectomy.

Two cases have come under the writer's personal observation.

A D. A woman age 32 married came under observation early in 1923 referred by Dr. Edgar E. Stewart of Great Neck, Long Island. The family history is negative. Both parents are alive and well. Patient had had typhoid fever when 8 years old. When 3 years old no urine was voided for a period of 3 days. Further details of this illness are unobtainable beyond the statement from the patient's

mother that after taking some medicine prescribed by a physician the condition cleared up and the patient was as well as ever. She has been married 6 years, has been pregnant twice, each time going to full term without complications. Both deliveries were normal and the children one 5 years old, the other 3, are living and in very good health. Her menstrual history is negative.

Chief complaint. As far back as she can remember it has been necessary to wear a napkin because of constant leakage of urine, and her mother states that as a child she was never dry. The wetting has been continuous day and night, and as far as the patient has observed not influenced by posture, bodily activity, or any other factor. As a rule the flow has been a gradual drop by drop secretion, the amount of moisture on the napkin depending upon the length of time worn. On rare occasions there has been a marked increase in the quantity of the leakage. No particular cause has ever been noted to explain these unusual fluxes.

The act of urination is always normal and without undue frequency or urgency; a normal desire to urinate occurs at regular intervals, there is no dysuria, and normal relief is experienced after the bladder is emptied. The leakage is independent of, and not influenced by, urination and is just as rapid immediately after urination as at any other time.

Physical examination. Patient is a well developed and well nourished young woman of strong physique. Nothing of pathological importance was discovered in the routine examination of the chest and abdomen. The pelvis is negative. The left side of the external meatus is oedematous but not congested. The external genitals are moist and when dried quickly become moist again, the dampness first appearing near the urinary meatus. A catheter can be passed into the bladder readily and clear urine is obtained. While the catheter remains in the urethra the genitals are dry but moisture appears again immediately after withdrawal of the catheter. Visual examination of the vagina and cervix is negative, except that the patient remains entirely dry while the speculum is in place but becomes wet immediately after the speculum is withdrawn. As it afterward developed the supernumerary ureter is situated to the left of the urethra, so that pressure from either a catheter in the urethra or a speculum in the vagina is sufficient to prevent the escape of fluid from the ectopic opening. With good exposure and light a small drop of fluid can be seen to form in the oedematous mucosa contiguous to the left lip of the meatus, and at this point a No. 5 F. ureteral catheter can be introduced into a small opening. The catheter passes its entire length 50 centimeters. Turbid fluid immediately flows through the catheter and with an aspiration syringe 30 cubic centimeters of the fluid is obtained, this fluid becoming progressively more turbid as the aspiration progresses until at the end it is purulent.

Cystoscopic examination shows a normal bladder with normal right and left ureteral orifices. Each

ureter is readily catheterized, the catheters pass up the usual distance and no obstructions are noted. Neither pelvis contains residual urine. The flow of urine from either catheter is intermittent in character and rapid in rate and the urine is clear in gross appearance in marked contrast to that obtained through the catheter in the ectopic opening.

Salt solution deeply colored with methylene blue was introduced into the bladder while negative pressure was maintained through the third catheter in an attempt to demonstrate a connection between the bladder and the anomalous opening, but none of the dye comes through the catheter. Salt solution deeply stained with mercurochrome was then injected through the ureteral catheters into each pelvis and these catheters withdrawn. Again no color can be found in the fluid coming from the remaining catheter.

At this stage of the examination it is possible to diagnose a supernumerary ectopic ureter coming either from a separate third kidney or from a kidney with two separate and non communicating pelvises.

A roentgenogram (Figure 1) shows that the catheter in the supernumerary ureter lies curled up in a circle of small radius just above the upper border of the symphysis, the entire length of the catheter having curled up in this area. A roentgenogram made after injecting a 25 per cent solution of sodium iodide into the supernumerary ureter shows an enormously dilated and sacculated ureter on the left side (Fig. 3). The ureter appears to end in a globular sacculcation, the upper portion of which reaches to about the level of the upper border of the sacrum. Beyond this point the injected fluid does not ascend. The structured portion of the ureter discovered after operation explains the failure of the opaque fluid to reach a higher level.

The left normal pelvis is very small with but two calyces. The left ureter is also very small but normal in position in its course from the pelvis to the bladder.

A pyelo ureterogram shows the right pelvis to be in normal position and of normal size and outline and the right ureter of normal size and position throughout its course from the pelvis to the bladder (Fig. 2).

	U in lys. by D.		Cyrus W. Field	
	Right	Left	5	per cent aly
Ammonia	018	016	030	
Sodium chloride	710	650	390	
Urea	840	780	430	
Uric Acid	026	024	015	
Creatinin	042	040	020	
Blood	None	None	None	
Fus	None	None	Very much	
Culture	Sterile	Sterile	Bac. coli communis	

Diagnosis. Supernumerary ureter opening near external urinary meatus. The supernumerary kidney or cephalic portion of the left kidney shows marked infection and poor functional activity.

Choice of operation. Implantation of the supernumerary ureter into the bladder was considered



Fig. 1. Opaque catheter introduced through the ectopic opening alongside of the external meatus coiled up in dilated left supernumerary ureter behind and above the symphysis pubis.



Fig. 2. Normal right pelvis, lower pelvis of the left kidney, and lower portion of the supernumerary left ureter.

inadvisable because of the infection present in the supernumerary kidney. Ligation of the ureter was discarded for the same reason. Exploration of the kidney was decided upon with the hope of finding a condition that would permit a heminephrectomy. The alternative was a nephrectomy.

Operation was done February 7, 1923. Patient was placed on her right side with a kidney bag under the flank. Incision was made from in front of the left anterior superior iliac spine upward and backward to end above the twelfth rib 3 inches from midline of back through skin, fascia and muscles exposing the peritoneal space. The kidney capsule was opened and the kidney was freed without difficulty and delivered into the wound for examination.

Two ureters each with a separate pelvis were found to come from a single kidney. A very small ureter, approximately the size of an eighteen gauge hypodermic needle, drained the lower pelvis. This ureter was situated behind and at the left or outer side of a very large supernumerary ureter draining the cephalic portion of the kidney. The vascular pedicle entered the kidney close to the upper pelvis and there was an entire absence of any vascular pedicle directly to the lower portion of the kidney. It was readily apparent that the distribution of the blood vessels precluded a heminephrectomy and the operation was finished as a nephrectomy. Without any particular technical difficulty, the kidney was

removed, the operation differing from the usual nephrectomy only in the necessity of removing two ureters. The smaller lower ureter was divided between ligatures and the lower end dropped into the wound. The larger ureter was freed by blunt dissection down as far as could be reached, there divided between ligatures and the wound closed in the usual manner using chromic gut sutures for the muscles, silk for the skin and silkworm gut tension sutures. A wrapped gauze drain was inserted for drainage.

The patient was then turned on her back and an incision corresponding to an intramuscular appendectomy approach was made down to the peritoneum on the left side. This was pushed forward and upward exposing the supernumerary ureter which was readily recognized. The ureter was freed until the upper end was brought out of the wound, after which the dissection was continued downward to just above the upper border of the symphysis pubis. Here this ureter was ligated and divided with the cautery. A wrapped gauze drain was inserted down to the stump of the ureter and the wound closed.

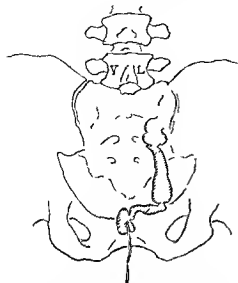


Fig. 3. Tracing made from roentgen gram showing sacculated and dilated supernumerary left ureter; the injected fluid reaching only part way up the ureter.

The kidney measures 11.5 by 4 by 7 centimeters and has attached to it two small ureters, one at the caudal extremity and the other at the cephalic end (Fig. 4). The external markings of the kidney are normal except for a small cyst of the lower pole.



Fig. 4. Roentgenogram taken after removal of the kidney showing the normal lower pelvis with a very small ureter and the small upper supernumerary pelvis with the greatly dilated ureter.

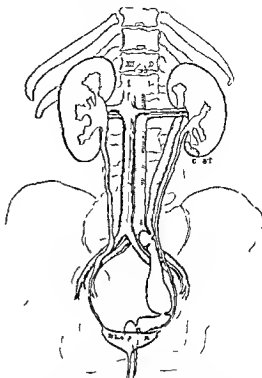


Fig. 6. Diagrammatic reproduction of structures as found by examination and at operation showing supernumerary and normal kidney pelves and ureters.

The kidney has two pelves. The cephalic pelvis is small and situated on the inner upper aspect of the superior pole. The ureter from this pelvis is more than 1.5 centimeters in diameter at the upper end and is alternately sacculated and constricted throughout its length. A small stricture at about its



Fig. 5. Dilated supernumerary ureter with constriction at about its middle. Because of this constriction the standard solution failed to pass up a dilated beyond the level of the upper border of the sacrum.



Fig 1 One catheter introduced through the ectopic opening is coiled above the symphysis. The other catheter introduced through the bladder is in the left ureter.

middle explains why the sodium iodide solution injected in making the pyelogram failed to pass upward beyond the level of the upper border of the sacrum (Fig 5). The lower pelvis is normal in size but its ureter is very small, the lumen admitting with difficulty a No. 18 gauge needle. A single vascular pedicle enters the kidney close to the cephalic pelvis. There is no line of demarcation showing the attachment of the supernumerary portion to the normal kidney.

Microscopic examination by Dr. William Crawford White. Sections show a congestion within the glomeruli and degeneration of the tubules almost resembling cloudy swelling. Some areas are free but there are many sections in which the tubules take the stain very poorly and the lumen is packed with a granular detritus. There are areas of hyalinization in the cortex. Section of the accessory ureter shows a great thickening of the wall with the deposit of some round cells and with a large deposit of detritus in the lumen.

Pathological diagnosis: Chronic nephritis, one normal ureter, chronic inflammation of accessory ureter.

CASE 2. D. T. is a 14-year-old school girl who has always been a normal, active, and healthy child in every way except for urinary incontinence. Her mother reports that she has never been dry from the time of her birth, although at the usual age she exhibited normal control of stool and urine. Urination



Fig 2 Roentgenogram showing the supernumerary right pelvis, the upper and lower sections of the supernumerary ureter, and the normal right pelvis filled with a solution of sodium iodide and an opaque catheter in the normal right ureter.

is voluntary at regular intervals in response to the usual demand and is followed by the usual relief. A continuous leakage goes on without any relation to urination and is not influenced in any way by the latter. The history is that typical of an ectopic opening of the ureter.

Physical examination is entirely negative except for cystoscopic and radiographic findings.

Cystoscopic examination. Bladder tolerance, bladder capacity, the bladder mucosa, trigone, and ureteral orifices are all normal. Catheters pass to either pelvis readily, no obstruction being noted. The flow of urine begins from each side immediately and is normally intermittent in character and rapid in rate. The urine is clear in gross appearance. There is no residual urine in either pelvis. Pyelograms of either side show the pelvis to be of normal position, shape, and size. Externally, just to the right of the external urinary meatus, there is a very small opening from

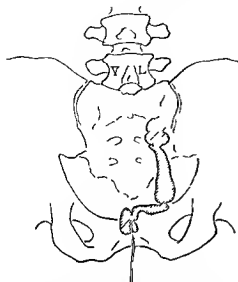


Fig 3 Tracing male from roentgenogram showing sacculated and dilated supernumerary left ureter the injected fluid reaching only part way up the ureter

The kidney measures 11.5 by 4 by 7 centimeters and has attached to it two small ureters, one at the caudal extremity and the other at the cephalic end (Fig 4). The external markings of the kidney are normal except for a small cyst of the lower pole.



Fig 4 Roentgenogram taken after removal of the kidney showing the normal lower pelvis with a very small ureter and the small upper supernumerary pelvis with the distally dilated ureter

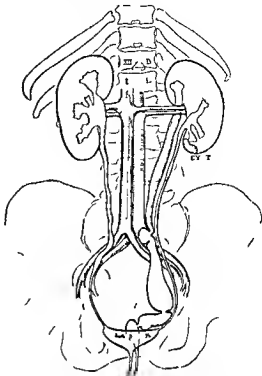


Fig 6 Diagrammatic reproduction of structures as found by examination and at operation showing supernumerary and normal kidney pelvis and ureters

The kidney has two pelvises. The cephalic pelvis is small and situated on the inner upper aspect of the superior pole. The ureter from this pelvis is more than 1.5 centimeters in diameter at the upper end and is alternately sacculated and constricted throughout its length. A small stricture at about its



Fig 5 Dilated supernumerary ureter with constriction at about its middle. Because of the constriction the sodium iodide solution failed to pass upward beyond the level of the upper border of the scrum.

freed upward until the cut end could be brought out of the wound then downward to the posterior aspect of the symphysis where it was cut between ligaments. Rubber tissue drain was inserted down to this point.

Pathological report Specimen consists of a kidney measuring 12.5 by 6.5 by 4 centimeters. The greater part of the kidney is of normal appearance but a separate and extra ureter enters the upper pole of the kidney and there opens into the small pelvis which drains the parenchyma of the extreme upper end. There is no sharp dividing line in the gross between the kidney tissues drained by the two ureters. The kidney parenchyma appears quite normal in the gross except that the parenchyma over the superior numerary pelvis is thinned out. The mucosa of the normal pelvis shows many small hemorrhages.

Microscopic examination by Dr. William Crawford Hite. Sections were cut through the kidney parenchyma draining into the normal and accessory pelvis. There is no marked difference in the kidney tissue in these two areas. Some of the convoluted and straight tubules were moderately dilated and lined by compressed more or less degenerated cells but on the whole the epithelial elements were well preserved. The glomeruli were normal only occasionally was a dilated glomerular space with a shrunken vascular loop encountered. There was no inflammatory reaction present though in the immediate neighborhood of the minor calyces and the accessory pelvis many of the collecting tubes had atrophied and were replaced by connective tissue.

Diagnosis Mild parenchymatous nephritis in kidney with accessory pelvis and ureter

A review of the literature has resulted in finding 98 reported cases these with the two here reported make a total of one hundred in all. These have been arranged in tables according to the type of anomaly as follows

Table I Single ureter with ectopic opening

Table II Complete unilateral duplication of pelvis and ureter with an ectopic opening of the supernumerary ureter

Table III Complete unilateral duplication of pelvis and ureter with ectopic opening of both ureters

Table IV Supernumerary kidney pelvis and ureter with an ectopic opening

Table V Bilateral duplication of pelves and ureters with one ectopic opening only

Table VI Bilateral duplication of pelves and ureters with bilateral ectopic openings

Table VII Both single ureters having ectopic openings

It is to be noted that 65 cases have been reported as occurring in females and 35 in the male a ratio of practically 2 to 1. Of the

female cases reported but nine were found at autopsy, the remainder are reported as operations or examinations while in the male cases reported 33 are autopsy reports. A diagnosis was made in the living male in only 2 cases.

**TABLE I—SINGLE URETER WITH ECTOPIC
OPENING**

K po te	e	Ag	R m rks
B k r	F	2	Ope t n
B k r	F	2	Ope t n
B k r	F	5	E m t
B as	M		A t p y
Ca ric	M		A t p y
Ch h	M		A t p y
C la	F	5	Ope t n
D spo t	F	9	Ope t n
D y	M		Ope t
Epp e	M		A t p y
G be	M		A t p y
Wunner	F	56	Ope at
J dd	F	2	Operatio
M dd a	F	6	E m to
W g i	M	St th	A t pay
W th f	F	7	Ope tio
W rner	F		Ope tion
M Arthur	F		Ope t
M ros	Ch dd		A t p y
Nuch l ch	M	4	A t pay
F	F	6	Ope at
R it th	M	52	A t p y
Schw i	F		Ope t
V M sa	F	4	A t pay



FIG. 9. Reproduction from roentgenogram of supernumerary and normal right pelvis and ureters.

which fluid escapes drop by drop. After considerable difficulty a small ureteral catheter was passed into this opening and a large amount of light colored slightly turbid urine was aspirated. The catheterization of this supernumerary ureter caused very considerable pain to the patient the only pain complained of during the examinations. During the catheterization of the accessory ureter colored fluid was successively injected into the bladder left kidney and right kidney without any of the color appearing in the urine from the extra ureter (Fig. 7).

The ureterogram of the supernumerary ureter shows a large dilated ureter extending from behind the symphysis up the right side to the level of the upper border of the sacrum where the outline is lost to reappear at the level of the lower border of the

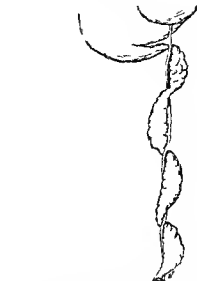


FIG. 10. The alternately dilated and constricted supernumerary ureter winding about the normal ureter. (From Mesley and Vess.)

third lumbar vertebra then extending upward as a funnel shaped tube large above (inside and above the normal right ureter and pelvis) evidently opening into the upper part of the right kidney (Fig. 8). There are none of the usual markings of calyces.

Operation. The usual kidney incision was made through the skin fascia and muscles exposing the right kidney. The kidney was freed with finger dissection delivered and the lower ureter readily identified. The supernumerary ureter attached to the upper pole of the kidney was identified as a very large tube and the vascular pedicle was isolated and found to enter the kidney at a point about midway between the ureters. There was no line of demarcation marking the kidney off into separate portions and it was decided that a total nephrectomy would be safer under the circumstances than an attempt to do a heminephrectomy. The lower ureter was divided between ligatures and the distal end dropped back into the wound. The larger ureter was then freed down as far as possible and cut between ligatures. The vascular pedicle was ligated with No. 2 chromic catgut ligatures. No clamps were necessary as the exposure was very good and it was possible to ligate the vessels separately. The kidney was then removed. The incision was closed in the usual way. A rubber tissue drain was placed down to the stump of the pedicle.

The patient was then turned on her back and an intramuscular incision made corresponding to that used for an appendectomy the peritoneum pushed forward and the two ureters readily identified—the supernumerary ureter being posterior to the normal one. The supernumerary ureter was then

TABLE by Dr. Cyrus B. Felt

	Left	Right	Trace
Color	Light	Light	Light
Sediment	Slight	Slight	Slight
Reaction	Alkaline	Neutral	19 N/10 acid
Ammonia	0.0061%	0.004%	0.0034%
Urea	340	296	221
Uric Acid	009	005	004
Creatinin	013	0092	0073
NaCl	21	23	57
Albumen	None	None	Very faint trace
Pos	None	None	Few
Cast	None	None	None
Epithelial Cells	Few	Few	Few
Culture	Sterile	Sterile	40 colonies B. coli per c. cm. urine

TABLE II—Continued

R p r t	S	Age	Oper t	R m k
Th m	F	23	Ope t	Right ureter d d m y sac t b type ope n w s t f i l t c e h d t f d w a c r d by m l f s perm m ry t
T y	F		Ope t	Right ureter m y uet r p e d t m e r y Right ureter m e r y post so th
W d ky	M	28	A t p y	Right ureter m e r y post so th
W rth m	F	28	Operation	Right ureter m e r y u t s d e t t d p e d t h t b m m
W l d	F	24	E m t	Right ureter m e r y u t s d e t t d p e d t h t b m m
W l d	F	2	Ope t	Right ureter m e r y u t s d e t t d p e d t h t b m m

TABLE III—COMPLETE UNILATERAL DUPLICATION BOTH URETERS ECTOPIC OPENINGS

R p r t	Sex	Age	Oper t	R m k
Ob i	M	55	A top y	Both ureters p e d th th post so
Rech	M	69	A t p y	Both ureters p e d th th post so

TABLE IV—SUPERNUMERARY KIDNEYS
URETERS AND PELVES

R p r t	S	Age	Oper t	R m k
S m l K e s d e a c h a	F	9	Ope to	Complete bilateral pelvic kidneys A pelvic ureters p e d k y s e p a t s a b o t h k l y b p e m r y c i p b m t h g n a R m t e p o r a t k i c y d e t t p u s s a t p e d t h g u n t w h
L e a	F	2	Ope to	Complete bilateral pelvic kidneys A pelvic ureters p e d k y s e p a t s a b o t h k l y b p e m r y c i p b m t h g n a R m t e p o r a t k i c y d e t t p u s s a t p e d t h g u n t w h

TABLE V—BILATERAL DUPLICATION OF PELVES
AND URETERS ONE ECTOPIC OPENING

R p r t	S	Age	Oper t	R m k
A l b e r g	F	28	Ope to	Right ureter p e r m r y t p d n e g m D t h n e s e p t l w g t h m p t t t p e t h t Right ureter p e r m r y u r t e r p e d t h g n a p t d d f m p u r a l t p y l
C t z e	F		A t p y	Right ureter p e r m r y u r t e r p e d t h g n a p t d d f m p u r a l t p y l
H d l	M	9	A top y	Right ureter p e r m r y t p e d p e t u r t h Th right ureter m e r y p e d t m m u t h t h t h t u l t y d t t h G u n t h t h p o s t t u r t h
H u n t g t o n	M	48	A t p y	Right ureter p e r m r y t p e d p e t u r t h Th right ureter m e r y p e d t m m u t h t h t h t u l t y d t t h G u n t h t h p o s t t u r t h
K o e p l i n a c h	F	4	A t p y	Right ureter p e r m r y t p e d p e t u r t h Th right ureter m e r y p e d t m m u t h t h t h t u l t y d t t h G u n t h t h p o s t t u r t h

TABLE VI—Continued

R p r t	S	Age	Oper t	R m k
M d e l a n g	F	14	E m n a t	Left ureter p e r m r y t p e d t t h v g a Left ureter p e r m r y t p e d i n t o p t a t u r t h p a s s g t h r g h t h e p o s t t
M l y a n d l	M		A t p y	Left ureter p e r m r y t p e d i n t o p t a t u r t h p a s s g t h r g h t h e p o s t t
M y	F	24	Aut p y	Right ureter p e r m r y t p e d t a t h t h t h
P e o c k	M	9 m	Autopay	Right ureter p e r m r y t p e d t t h p t t h t h r L f t p e r m r y t h r l e d i b l d s a
R a m p e l	F		A top y	Right ureter p e r m r y t p e d t t h d o f t h t h t h r y m t
T g l	M	8	A t y	Left ureter p e r m r y t p e d t h t h p o s t
W h	M	30	A t p y	Th ureter p e r m r y t p e d t h t h p o s t
W u g n	M		Aut p y	Right ureter p e r m r y t p e d t h t h p o s t
Z f k y	M		A t p y	Right ureter p e r m r y t p e d t h t h p o s t

TABLE VII—COMPLETE BILATERAL DUPLICATION OF PELVES AND URETERS WITH
BILATERAL ECTOPIC OPENINGS

R p r t	S	Age	Oper t	R m k
S t a m e l	F	5	Ope to	Bilateral complete duplication with ectopic ureters t p e d t h t h p o s t
K m m t n l G u l	F	25	Ope t n	Bilateral complete duplication with ectopic ureters t p e d t h t h p o s t

TABLE VIII—BOTH SINGLE URETERS HAVING
ECTOPIC OPENINGS

R p r t	S	Age	Oper t	R m k
B u n a n g	M		A t p y	Right ureter p e r m r y t p e d t h t h p o s t

TABLE IX—TABULATION OF REPORTED CASES
FOUND IN LITERATURE¹

	Ope t	F m l A top y	E a m t n	Ope t	M f A t p y	T t l
T h l I	1					
T h l II	37	4	2	1	0	4
T h l III	0		1		3	55
T h l IV			0	0	0	
T h l V		0	0	0	0	
T h l VI		0	0	0	0	
T h l VII		0	0	0	0	
T t l	51	0	0	0	0	

Th t h t w s l d d t h t t b l

TABLE II—COMPLETE UNILATERAL DUPLICATION WITH ECTOPIC OPENING OF THE SUPERNUMERARY URETER

R p o t	Sex	Age	Operation	Remarks
Albarrá	F	6	Operation	Ectopic opening of the right ureter into the vagina
Albarrá	F		Operation	Supernumerary ureter opening into the vagina
B. mm	F	8	Operation	Right ureter opening into the vagina
R. n. k. l. f. t.	F	15	Operation	Left ureter opening into the vagina
Ch. t.	M	4	Operation	Supernumerary ureter opening into the vagina
C. l.	M		Atopsy	Supernumerary ureter opening into the vagina
D. m.	F	17	Operation	Left ureter opening into the vagina
Duck. m.	M	57	Atopsy	Thickening of the posterior wall of the bladder
E. l. h.	M		Atopsy	Supernumerary ureter opening into the vagina
F. l. h.	F		Atopsy	Right ureter opening into the vagina
F. mm	F		Operation	Supernumerary ureter opening into the vagina
F.	F		Operation	Left ureter opening into the vagina
F. l.	F	38	Operation	Thickening of the posterior wall of the bladder
H. l. m. J. P.	F	40	Operation	Left ureter opening into the vagina
H. l. m. A. J. h.	F	35	Operation	Right ureter opening into the vagina
H. y. w. l.	F	34	Operation	Right ureter opening into the vagina
H. f. m. C. E. F.	M	4	Atopsy	Left ureter opening into the vagina
H. f. m. C. E. E.	M	4	Atopsy	Right ureter opening into the vagina
H. h. m.	M	5	Operation	Thickening of the posterior wall of the bladder
Jaff.	F		Operation	Left ureter opening into the vagina
J. ph.	F	9	Operation	Left ureter opening into the vagina
J. s. s. o.	F	3 wk.	Atopsy	Thickening of the posterior wall of the bladder
J. d. d.	F	48	Operation	Thickening of the posterior wall of the bladder
J. v. a.	F	4	Operation	Thickening of the posterior wall of the bladder

TABLE II—Continued

R p o t	Sex	Age	Operation	Remarks
Kak. sch. k.	F	3	Operation	Right ureter opening into the vagina
Kak. sch. n. k. a. l. l. m. n.	F	3	Operation	Right ureter opening into the vagina
K. l. l. y. d. B. a. r. a. m.	F	5	Operation	Right ureter opening into the vagina
K. l. l. y. a. n. d. B. a. m.	F	3	Operation	Right ureter opening into the vagina
K. l. l. k. o.	F		Atopsy	Right ureter opening into the vagina
L. t. t.	F		Operation	Right ureter opening into the vagina
L. a. t. h.	M		Atopsy	Supernumerary ureter opening into the vagina
Lechl.	F	1 f. t.	Atopsy	Thickening of the posterior wall of the bladder
L. a. k.	F	7	Operation	Thickening of the posterior wall of the bladder
M. a. s. o. n.	F		Operation	Right ureter opening into the vagina
m. f.	F	39	Operation	Thickening of the posterior wall of the bladder
Nach. l. b.	M	4	Atopsy	Supernumerary ureter opening into the vagina
Nord. J. o. n. d.	F	4	Operation	Supernumerary ureter opening into the vagina
O. l. l. h. e.	F	5	Operation	Supernumerary ureter opening into the vagina
Palma.	M	6	Atopsy	Supernumerary ureter opening into the vagina
R. l. l. y. t.	M	45	Atopsy	Right ureter opening into the vagina
R. a. y.	M	6	Atopsy	Right ureter opening into the vagina
R. h. o. n. B.	M	63	Atopsy	Right ureter opening into the vagina
R. o. n.	F	39	Operation	Left ureter opening into the vagina
S. h. f.	F	4	Operation	Right ureter opening into the vagina
S. t. f.	F	3	Operation	Left ureter opening into the vagina
T. F. r.	F	24	Operation	Supernumerary ureter opening into the vagina

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Fig. 3 Sagittal section of normal pelvis



Fig. 4 Shows distention of tube

told that this was the condition) but further investigation proved this not to be true. Upon attempting to sweep the examining fingers across the head to ascertain its position it was discovered that the head while in the pelvis was not in the vagina. A thin membrane between the examining finger and the head thought at first to be the fetal membranes was found to be the septum between the vagina and Douglas pouch stretched to an almost incredible thinness. The cervix could not be felt. The head filled the pelvis to the level of the ischial spines (Fig. 1). A diagnosis of extra uterine pregnancy at full term with a living child was made and an immediate delivery was agreed to. The patient was removed to the Maryland General Hospital and operated upon the same afternoon.

Operation. The abdomen was opened by a left median incision 15 centimeters in length extending equally above and below the umbilicus. When the abdomen was opened the tumor described as occupying the median line presented in the lower part of the incision and was found to be the enlarged uterus. Attached to the posterior surface of the uterus and extending laterally to either side was a quadrilateral mass about 12 by 16 centimeters. This was the placenta which was attached chiefly to the posterior surface of the broad ligaments and the posterior surface of the uterus. There were some small extensions of the placenta to the right side attached to the

mesentery and folds of small intestine by light adhesions. Extending from the upper border of the placental mass was the thin fetal sac (Fig. 2). On the right side the fallopian tube could be seen extending along the upper border. The left tube was not visible but was apparently incorporated in the mass. The sac was opened and the left foot which had been felt at the external examination presented. The child was delivered and seen to be a well developed normal child. It weighed 8½ pounds. When the sac had been emptied it was decided that the placental mass could be removed entire or nearly so if the uterus were removed at the same time. This was done after tying off several adhesions to the intestines. There was very little bleeding. The incision was closed with two iodoform cigarette drains for drainage.

The patient made a good recovery, the only complication being a slight infection of the incision. I think this was probably due to the drains which might have been omitted with advantage. She was discharged on the twenty-eighth day entirely well. The baby was also in good condition except for a stricture of the pylorus from which it apparently entirely recovered. It is now living and well.

The most interesting feature of this case it seems to me is the complete descent of the head into the pelvis—indeed the development of the head must have been entirely in the pelvis. One can hardly account for the

EXTRA-UTERINE PREGNANCY AT FULL TERM

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EXTRA-UTERINE pregnancy at full term with a living child is relatively so rare that I wish to report the following case.

CASE. On February 2, 1921, I was called to see Mrs. L. R., age 38, in part. At this time she was reported to have been in labor for 2 days, apparently at full term. The family history was negative; her childhood and early life had been normal; there was no history of pelvic disease. Her first pregnancy and labor, which had occurred 13 years before, had been normal; the child was still living and in good health. Subsequent menstrual history was normal until May 15, 1920, when last normal menstruation occurred.

Present pregnancy. In June, 1920, she had a profuse discharge, dark in color and with a rather offensive odor but without pain. There is no history of pain at the time of this first discharge or during the next few weeks. In July or August (she was uncertain as to the exact time) she began to have cramplike pains in the lower abdomen and on several occasions felt quite faint. Since the first attacks of pain she had had no faintness but had suffered almost constantly some discomfort in her lower abdomen, usually associated with frequent and more or less painful urination.

Physical examination showed a well developed rather stout woman with negative findings except in the abdomen and pelvis. The abdomen was quite distended, smooth and symmetrical, giving on inspection the appearance one sees in cases of pronounced hydramnios or twin pregnancy at term. On palpation the tense and thick abdominal wall prevented the obtaining of fetal outlines, though what was thought to be a foot was felt on the left side above the level of the umbilicus. In the median line, extending from the symphysis nearly to the umbilicus and pressed firmly against the abdominal wall was a tumor mass which could easily be felt measuring about 7 by 12 centimeters. The fetal heart could be heard distinctly on the right side far back below the level of the umbilicus.

Vaginal examination showed the presenting part the head occupying the pelvis. At first it seemed to be a case in which the head had descended to the pelvic floor after complete dilatation (when called to the case I had been



Fig. 1. Shows the relations of the child at the time of the first examination.

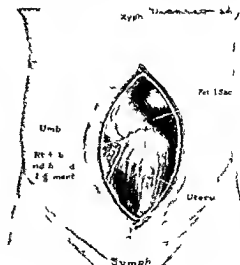


Fig. 2. Shows the abdomen opened with the enlarged uterus, right tube and fetal sac.

EXPERIMENTAL NEPHROTOMIES

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MOORE and Corbett (6, 7) studied experimentally the damage done to the kidney by operation with a study of the loss of function resulting from such procedure. Some of their conclusions were as follows: (1) An operation on the kidney always destroys a certain amount of kidney substance. (2) The section of the kidney does less harm than the suture necessary to control hemorrhage. (3) The suture of the capsule alone is not sufficient to control the hemorrhage. (4) The destruction of the kidney extends far beyond the site of operation. (5) Functional activity of the kidney is somewhat reduced. (6) Histologically great damage is done to the kidney substance.

Magoun in 26 experimental nephrotomies on 3 dogs concluded that in 14 of his experiments there was a reduction in the function of the kidney and that this reduction was in proportion to the amount of kidney tissue destroyed. In these 14 cases the following complications were observed: uræmia 7, hemorrhage 2, stone formation 4. Realizing that hemorrhage is one of the chief complications of nephrotomy, various methods of suturing the kidney were recommended by Moore and Corbett (6, 7), Rehn (1921, 8), Ciminata (1922, 3), Janu (1922, 4), Magoun (1935, 5) and Beer (1933, 1).

Carson and Goldstein (2) performed 14 nephrotomies on 7 dogs and 7 rabbits in which no sutures were used; the kidney halves being approximated and held under light pressure until bleeding ceased without encountering postoperative hemorrhage, fistula, uræmia or stone formation. The histological study of nephrotomized kidneys without sutures demonstrated a minimum destruction of kidney tissue. Realizing that nephrotomy without sutures is a radical procedure and hoping to secure a method which would tend to minimize the element of danger, the author performed the following experiments:

METHOD OF EXPERIMENTATION

The experiments were performed on 18 dogs. In Group 1, 16 dogs were used. In Group 2, 7 dogs used in Group 1 were returned for a third operation and 2 were used upon which a nephrectomy had previously been performed. All of the operations were performed under ether anesthesia, with sterile technique. The kidneys were delivered through a lumbar incision and the perirenal fat stripped in all cases. In Group 1 the peritoneum was torn in dogs Nos. 14 and 9 and in Group 2 in dog No. 5 this was closed with catgut before the kidney was sectioned. No clamps were used on the renal vessels in any case. A scalpel was used in all cases for making the incision. In each experiment the kidney was incised from pole to pole down to the pelvis in the midline. The bleeding surfaces were sponged quickly so that the architecture of the kidney could be observed. The cut surfaces of the kidney were then approximated and held together by light pressure while interrupted Cushing sutures (No. 0 plain catgut) were introduced into the capsule without injuring the kidney with the needle. All sutures were tied under slight tension. The time elapsing between the approximation of the kidney halves and the cessation of bleeding was recorded as the bleeding time. After the bleeding ceased the kidney was watched for 15 minutes before it was replaced into its pocket and then again observed for from 5 to 10 minutes before the wound was closed. The wound was closed by the layer method with No. 1 chromic catgut. All wounds were closed tightly with cotton and collodion dressings. All animals recovered from anesthesia within 15 minutes from the time ether was discontinued. After being returned to their cages they were watched carefully for blood in the urine. In 24 of the 25 experiments there was no blood in the urine after the fourth day. They were kept on a liquid diet for 2 or 3 days. The first day after operation the ani-



Figs 5 and 6 Showing how the pelvic development of the head probably acted to prevent the downward growth of placenta.

extreme stretching of the thin partition in front of the child's head or think it possible except as the result of a very slow distention (Fig 1) The uterus had been entirely displaced no portion of it being in the pelvis. The pain and discomfort reported as being present after the first few weeks largely referred to the bladder and continuing throughout pregnancy after the first two months were no doubt due to the displacement of the bladder and constant pressure by reason of the pelvic position of the head. It requires no great stretch of the imagination to think of the very thin membrane covering the head being mistaken for the bag of waters with its consequent artificial rupture and the delivery of the child through the vagina.

Another interesting feature was the development of the placenta which with the exception of a few small extensions was an almost exact quadrilateral mass. The very fortunate failure of the lower border to spread over the pelvic floor was due no doubt to the pressure applied in an upward direction by the pelvic development of the head.

The decision to operate immediately was due to the fact that the child was evidently fully developed alive and in good condition. Statistics show that a large number of children survive the operation and this makes it important that the interest of the child should

not be disregarded. The mortality in operations at term is very little increased over that in operations of a later date. Beck in a very complete review of this condition expresses the opinion that allowing the pregnancy to continue with the resulting death of the child with the expectation of an easier and safer delivery later may eventuate in equal difficulties at delivery, an uncertain period of ill health for the mother and usually shows only a slightly decreased mortality.

Immediate operation in such cases as that reported above gives the certainty of a living child. This is somewhat offset by the fact that a relatively large percentage of these children are deformed.

This case illustrates the importance of a very careful supervision of pregnant women and a proper regard for a history of irregular bleeding occurring early in pregnancy especially if accompanied by pain in a case which does not eventuate in miscarriage. Early pelvic examination in such a case could not help but demonstrate the nature of it as a part of the fetus which could easily have been felt occupied the pelvis after the first few weeks. A pelvic examination at any time before labor must have disclosed the absence of the cervix. In this particular case the physician was not called until labor had set in because of the Christian Science proclivities of the parents.



Fig. 3 Right kidney dog No 22 120 days



Fig. 4 Photomicrograph right kidney dog No 22



Fig. 5 Left kidney dog No 5 166 days

Eight were sacrificed from 16 to 120 days after the nephrotomy. Gross examination of these 8 kidneys showed the line of incision to be occupied by a scar 1 to 2 millimeters in width and of a yellowish gray color the striate lines on each side of the scar being distinct in outline. In no instance was there any complication such as infarct postoperative uræmia stone formation or fistula.

Microscopical results in Group In the nephrotomized kidney of 14 days (Figure 2) the line of incision is occupied by scar tissue 1 to 2 millimeters in width. The fibroblasts are seen entering the line of incision from the capsule and from the interstitial tissue on each side. There is a moderate thickening of the interstitial tissue for a distance of 1 millimeter on each side of the scar line. The glomeruli on each side are moderately swollen with their epithelial and endothelial cells well stained. The tubules in close proximity to the scar are dilated with their epithelial cells well preserved. In several areas the tubules show their epithelial cells to be swollen and finely granular in appearance. An organized blood clot is seen distending the major and minor calyces.

Section from the nephrotomized kidney of 16 days shows the line of incision occupied by a large number of young fibrous connective tissue cells mononuclear wandering cells a few polymorphonuclear leucocytes small round cells and a few poorly stained red blood cells. New formed blood vessels are seen distended by red blood cells and a few

leucocytes. The interstitial tissue on each side for a distance of 1 millimeter is edematous. Glomerular tufts and tubules are poorly stained for 1 millimeter on each side of the scar line. Beyond this the kidney shows no changes. Nephrotomized kidneys of 35 days and thereafter show the line of incision to be occupied by scar tissue averaging 1 millimeter in width and the interstitial tissue to be thickened for 0.5 to 1 millimeter on each side. New formed blood vessels are seen moderately distended by blood. The tufts and tubules in close proximity to the scar line are well preserved. Beyond this the sections appear the same as the controls.

DISCUSSION

Since the work of Moore and Corbett (6) demonstrated conclusively that sutures in the kidney substance destroy more tissue than the section into it and in a previous communication we (2) showed that nephrotomy without sutures destroys a minimum amount of kidney substance it seemed advisable to find a method which would appear rational and yet preserve the maximum amount of kidney tissue therefore the above experiments were carried out to ascertain the value of interrupted sutures in the capsule.

In the 25 nephrotomies performed with interrupted sutures in the capsule postoperative hemorrhage occurred in 1 instance (4 per cent, Dog 14 Chart 2). As the dog was still active on the fourteenth day and examination of the kidney showed a scar in the line



Fig. 1 (left) Right kidney dog No. 14 14 days

Fig. 2 Photomicrograph right kidney dog No. 14

imals were always allowed to run. In Group 1 they were returned for a second operation in 12 instances, the time varying from 4 to 266 days. At this time a nephrectomy was performed on the kidney that was first nephrotomized. Three of the dogs were sacrificed at this time to obtain the other kidney for control. In Group 2 each dog was sacrificed in from 14 to 120 days. All of the kidneys were studied grossly and microscopically.

RESULTS

Gross results in Group 1. In the 16 nephrotomies on dogs with both kidneys from 3 to 5 sutures were used, average 3.6. The bleeding time varied from 2 to 15 minutes, average 5.4 minutes. The thickness of the blood clot between the kidney halves varied from 2 to 5 millimeters at the time the kidney was returned to its pocket. Gross examination of these kidneys on cross section show the line of incision up to 15 days to measure 3 to 5 millimeters in width, being yellowish red in color. The striate lines of the kidney in each instance were visible at the edge of the organized blood clot. From 15 to 266 days the scar line varied from 1 to 5 millimeters in width, being grayish white in color, with the striate lines visible at the edge of this scar line. Four of the 16 dogs died: 1 on the fourth day from peritonitis, 3 from lobular pneumonia on the fifteenth, twenty-ninth, and thirty-first day, respectively. Three were sacrificed to obtain the other kidney for control. In no instance was there any complication such as infarct, postoperative hemorrhage, urinary stone formation, or fistula.

Microscopical results in Group 1. In the nephrotomized kidneys up to 10 days the line of incision is occupied by an organized blood clot and connective tissue fibers are seen entering the line of incision from the capsule and from the interstitial tissue on each side. The glomeruli and tubules in close proximity to the blood clot are fairly well preserved with well stained nuclei. New formed blood vessels are seen. In the nephrotomized kidney of 15 days the line of incision is occupied by young connective tissue cells which are well stained, young blood vessels, mononuclear wandering cells, small round cells, a few poorly stained red blood cells, and a moderate amount of haemosiderin. Nephrotomized kidneys of 24 days and thereafter show the line of incision to be occupied by scar tissue averaging 1.7 millimeters in width, with a thickening of the interstitial tissue due to fibrous connective tissue cells for a distance of 1 millimeter on each side with no disturbance to the remainder of the kidney.

Gross results in Group 2. In 9 nephrotomies on dogs from which one kidney had previously been removed from 3 to 5 sutures were used, average 4. The bleeding time varied from 2 to 10 minutes, average 4.8 minutes. In Dog 14 there was still blood in the urine on the fourteenth day; the dog had been as active as all others in these experiments and its general appearance showed it to be in good condition. When sacrificed the kidney, ureter and bladder were found to be distended with organized blood clot. The line of incision showed a scar of a yellowish gray color, 2 to 3 millimeters in width (Figure 1).

3 Postoperative hæmorrhage was encountered in 1 case (4 per cent)

4 Histological study of the nephrotomized kidneys shows a minimum destruction of kidney substances

I am indebted to Professor Hugh R. Spencer for his valuable suggestions at all times

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SPONTANEOUS RUPTURE OF THE OESOPHAGUS

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RUPTURE of the oesophagus is of sufficiently rare occurrence to merit note. Since first Boerhaave reported the case of Admiral Baron Wassenaar in 1724 there have been recorded in the literature 33 cases of spontaneous rupture of the oesophagus. It is not our purpose to review these cases here as full reviews may be seen in the papers of McWeeney, Bowles and Turner, Roy, Whipham and Menne.

Fitz in his paper held that except in two cases reported by Mayer and Allan and by Grammatzki up to that time no other cases had been definitely established of death having been caused by this condition. Sufficient cases have since been observed to demonstrate that spontaneous rupture of the oesophagus is a clinical entity and the immediate cause of death where it has occurred although most textbooks (e.g. Choyce, Charles, Ochsner, Keen, Warbasse) are agreed that it seldom occurs apart from disease of the oesophagus usually called oesophago-malacia and sometimes alcoholic oesophagitis.

While many have observed the pathological condition of the area where rupture has occurred and in some cases have reported adjacent areas denuded of epithelium and frequently remarked on the morbid condition of the oesophageal tissues there has been a

decided difference of opinion as to what extent these conditions are the predisposing cause of rupture and to what extent they are the result of postmortem changes.

Comparatively few histological findings have been reported apart from the excellent paper of McWeeney. Experimental work done by Mackenzie, Bowles and Turner and Broesch was designed to demonstrate the possibility of rupture by mechanical forces and the usual location of such rupture.

Having had an opportunity to observe recently a case of spontaneous rupture of the oesophagus and having made microscopic examination of the oesophagus and stomach we compared these findings with those observed after similar lesions of the oesophagus had been experimentally produced in two previously healthy animals. Sections were made in each case immediately at death and again after a period of 24 hours of postmortem degeneration in the cadaver to determine what degree of postmortem degeneration occurs due to autodigestion of the oesophagus and to what extent this can explain postmortem findings in cases of ruptured oesophagus.

CASE REPORT

The patient as in so many of the reported cases was a man of alcoholic habits. He had always been fairly healthy until about 6 or 8 years ago when he

CHART I—INTERRUPTED SUTURES IN KIDNEY CAPSULE

Dog No.	Kidney	D t f ph t my	Size f k d y t ph of m (cm)	N t f sutures	Blood g t me (no n in)	D t f nephrec t my	Size f k d y t nephrectomy (cm)	Width of scar (mm)	Days living	Blood in urine (d y)	Remarks
9	Right	6-9-4	6 5x4 2 5	4		6-3-4	6 5x4 3	4	4	4	Died 1 m post operation
34	Right	10-24-4	6 5x4 2	4	4	3-4	6 4 2 8	3	0	3	Sac died
7	Left	1-10-3	6 8	4	5	4 13 24	5 5 2	2	5	3	Died from severe pneumonia
4	Left	0-24-25	6 2x4 2	3	5	0-3	6 5 5 3 4	5	4	4	
6	Right	0-30-3	6 2x5 2 3	3	4	5 3	5 5 3 4	2 10	0	4	Died 1 m later from
20	Left	12-5-23	5 2x3 2	3	5	0-23	5 3	2	3	3	Died 1 m later from pneumonia
	Left	2-4	6 2x3	3	4	4 5 4	6 4 2 3		45	4	
3	Left	7 3 4	5 3 6 5	4	3	0-24 4	5 2x4 2 5	2	6	3	Sac died
2	Left	7 4 4	6 2x4 2 3	3	4	0-1 4	6 5 2 5	2	00		
5	Left	4 24 4	7 2x4 2 3	4	2	0-4	7 5 2x3 6		100	3	
8	Right	6-8-4	6 5 2 4	4	2	0-0-4	5 3 5		22	3	
9	Left	8 3	7 2x4 5 3	3	8	3 13-24	4 2 2 4	1	110	4	
7	Right	5 5 4	4 5 3	5	15	10-8-4	5 1 3 3		13	5	
6	Right	5-24	6 5 5 5 3	4	5	10-3 4	5 2x4 2 2	1	26	1	Sac died
3	Left	3 10-3	6 2x4 3 6	4	4	0-4	6 2x3 3	1	25	3	
8	Left	3 10-3	5 2 3 3	3	5	10-23	6 3 2 2	2	100	3	Flour 3

Port open opened d ing ph tomy

CHART II—INTERRUPTED SUTURES IN KIDNEY CAPSULE OF DOGS FROM WHICH ONE KIDNEY HAD PREVIOUSLY BEEN REMOVED

Dog No.	Kidney	D t f ph t my	Size f k d y t ph of m (cm)	N t f sutures	Bleeding time (min w/et)	D t f scar	Size f k d y t nephrectomy (cm)	Width of scar (mm)	Days living	Blood in urine (d y)	Remarks
3	Right	3 0-4	8 4 2x3	4	4	3-20-4	2 26 25 5	10 2	4	14	Sac died
5	Right	3 4 4	3 2x4 2 3	4	5	3-20-4	6 2x4 3		6	4	
36	Left	2-4	5 4 2 3 6	3	4	15 5	7 2x4 3 3		35	3	
3	Left	6-4	7 3 3 6	3		5 5	7 3 5 5		6	3	
1	Right	3 4	7 2x4 2 3 4	5		12-5	7 2x4 3 5		7	4	
3	Right	4	3 2x4 3	3	4	13 25	6 5 3 2x3	1	20	3	
8	Left	3 4	6 2x3 3	4	3	2-0	6 2 2 4	1	90	3	
7	Left	5 4	7 2x4 2 3	3	6	2-5-25	5 2x3 2x3	20	100		
	Right	7 0-24	3 2x3 2x4	4	5	0-8-4	7 5 5 2x4	1	20	3	Flour 3

Port open opened d ing neph tomy

of incision with a large number of glomerular tufts and tubules well preserved it seemed as though recovery might have been complete. According to Rehn postoperative hemorrhage occurs in from 10 to 12 per cent of cases.

CONCLUSIONS

1. Nephrotomy in dogs with interrupted Cushing sutures in the capsule is apparently a safe procedure.
2. Cessation of bleeding is brought about by the production of a physiological clot.

EXPERIMENTAL OBSERVATIONS

In the records in the literature covering thirty three cases of rupture of the oesophagus there appeared to be a question of how many of the histological and anatomical changes were due to pre existing disease and how many to postmortem softening and degeneration. It therefore occurred to us to study the effect of experimental lesions of the healthy oesophagus in the living animal and observe what degree of change occurred postmortem. We made a copper olive of such size that it would just pass the larynx of a small dog. This olive was cut half way through with a saw in such a way as to make a sloping slot the distal apex of which emerged at the widest part of the olive. A piano wire was fastened into the small end of the olive to provide control of its position in the oesophagus. A Maussoneuve urethrotome was then inserted in the slot where its cutting surfaces were concealed leaving the handle parallel with the wire of the olive. The animal being anesthetized the apparatus was passed down the oesophagus in this position and when the correct location had been reached the olive was held stationary and the knife pushed onward causing it to emerge from the apex of the slot and perforate the oesophagus. In this position the apparatus was then withdrawn for a distance of 1 inch thus producing an incision 1 inch in length through the oesophageal wall on the right side. The knife was then withdrawn within the olive and the whole apparatus removed without causing further injury to the mucous membrane.

Upon recovering from the anæsthetic the animal was noticed to limp on the right fore leg and to jerk its head around to the right side. It was much less active than before the operation and refused all food. Shortly after recovering from the anæsthetic it was given morphine in order to induce vomiting. The vomitus consisted of food particles mucus and streaks of blood. It did not vomit again. After 23 hours the animal was chloroformed and a postmortem was performed at once.

The autopsy showed no evidence of emphysema. Upon removal of the sternum it was at once seen that numerous fine fibrous

adhesions traversed the anterior mediastinum. The right pleural cavity was also crossed by numerous adhesions of a similar character. In the interstices between these adhesions and filling the right pleural sac there was a large quantity of thin blood stained fluid. This fluid was removed and measured 154 cubic centimeters in volume. It contained numerous Gram positive cocci and large Gram positive bacilli. The right pleura was intensely injected and inflamed and covered with a fine layer of fibrin.

Following the same method a second animal was used and a lesion of the oesophagus produced about 1 inch in length on the right side 1.5 inches above the diaphragm. The animal refused to move about and lay in a cramped curled up position wedged into a corner of the kennel. A frequent catch in the breath was observed. He became acutely ill and died 20 hours after operation.

An autopsy was performed and revealed exactly the same conditions as were found in the previous animal. The left pleural cavity and lung were quite normal in appearance. There was again no evidence of emphysema. The right pleural cavity was filled with a sanguineous fluid and the anterior mediastinum and pleural cavity contained many recently formed adhesions. The right lung was collapsed against the posterior thoracic wall. A linear incision 1 inch in length passed through the oesophagus about 1.5 inches above the diaphragm on the right side. There was no blood in the stomach. Sections through the lesion again showed no indication of any inflammatory reaction.

If a conclusion may be drawn from only two experiments we may say in the first place that postmortem alterations are not responsible for the gross and microscopic changes observed in human cases. In the second place it would appear probable that spontaneous rupture of the oesophagus is preceded by some inflammatory lesion which weakens the oesophageal wall for in our experimental animals the inflammatory changes which are so characteristic of the human cases were completely absent. The right lung was of much smaller volume than the left and was compressed against the pos-

developed some form of gastric trouble characterized by occasional attacks of belching of gas with distress after meals. This condition was thought to have been due to peptic ulcer. For about a year before his death the patient had been in the habit of drinking an unusual amount of water getting up three or four times each night for a drink. He had not consulted a physician about this. On October 15 he ate his lunch as usual and about 3 p.m. went out grouse shooting. He walked about on the prairie until 7 p.m. when he called at a farm house and was given a drink of cherry wine which was the only nourishment taken since lunch. He then started back toward home and arrived there about 10 p.m. During the return journey he experienced slight abdominal discomfort and shortly after arriving home he vomited. During the act of vomiting he was seized with a most intense pain in the upper abdomen just beneath the lower end of the sternum. He exclaimed my heart has burst and declared he felt something tear within him. Great pain was immediately experienced and a physician was summoned at once. The patient did not toss about but lay absolutely still and begged not to be moved in any way. During the next hour and a half he received by hypodermic injection over a grain of morphine without any material relief from the excruciating pain. The pulse was 86 and the respirations were observed to be short, catchy and rapid but were not counted. The systolic blood pressure was 130 the diastolic 75. His color was good. There was no rigidity or tenderness of the abdomen. The pain continued intense throughout the night and was so agonizing that it was impossible to remove the patient's clothing. Early in the morning he was again given morphine and later was brought to hospital. When he was admitted to hospital pain was the principal symptom. The pulse was now 140 the respirations 60. The abdomen was a little distended but not rigid except immediately over the diaphragm. The lower abdominal wall was quite soft. He had not vomited again. The breath sounds over the anterior and lateral surfaces of the left side of the chest were suppressed. The heart did not appear to be abnormal or displaced. The leucocyte count was 9,200. The urinalysis showed 2 per cent sugar, a faint trace of albumin, a few pus cells and a few granular casts. The blood sugar was 52 per cent creatinine 4.5 milligrams per 100 cubic centimeters.

These findings showed the presence of a diabetic condition for which he had never consulted a physician nor had any treatment. The patient was so ill that operation was deemed inadvisable. He grew steadily worse and in spite of large doses of morphine the pain was never controlled. The pain at one time radiated round to the left side of the chest and the left shoulder and down the left arm. He died at 8 p.m. a little less than 20 hours after vomiting ushered in the attack.

Autopsy findings. At the autopsy, which was performed 22 hours after death the following points

were noticed. There was no emphysema of the skin. In the abdominal cavity there was no free fluid nor sign of any inflammatory condition. The abdominal organs showed no evidence of disease. The right pleural cavity, the right lung and the heart showed no abnormality. The left pleural cavity was practically filled with a dark reddish brown fluid containing numerous particles of meat and other solid foods. The lung on the left side was completely collapsed and when the chest was first incised air rushed in showing a negative pressure. A perforation 1 inch in diameter was found about 1 inch above the diaphragm and on the left side of the esophagus leading directly into the pleural cavity. The stomach contained a considerable amount of dark reddish brown fluid and it was easily possible to force this fluid through the rupture of the esophagus into the left pleural cavity.

Sections were taken through the lesion of the esophagus, the esophagus just above the lesion through the cardiac orifice of the stomach and through the fundus of the stomach. Upon examination the section from the upper esophagus showed abundant cellular exudate between the muscle bundles. This was much more pronounced in the outer than in the inner layers. These inflammatory cells were mostly mononuclear in type but there were also numerous polymorphonuclears. The epithelium appeared normal. In sections stained by Gram's method enormous numbers of bacteria could be seen in the outer layers of the esophageal wall, a few in the inner layers and none at all on the surface of the mucous membrane. Most of these bacteria were large Gram positive bacilli with a few Gram positive diplococci. Section through the lesion showed such extensive destruction and disintegration of the wall of the esophagus that it was not possible to be certain which was the inner and which the outer coat. All trace of the mucous membrane had disappeared. In the middle of the muscular coat there was a large collection of inflammatory cells mostly polymorphonuclears with a smaller number of mononuclears. In sections stained with Gram there was again the same intense bacterial invasion. In addition there were considerable numbers of yeast like bodies some in the process of budding.

Section through the cardiac orifice resembled the histological picture seen at the site of the rupture. The mucosa had entirely disappeared and the muscle tissue was disintegrated and infiltrated with inflammatory cells and bacteria. Section through the fundus of the stomach showed the serous muscular and submucous coats to be quite normal with no trace of inflammation. The mucous membrane showed a certain amount of degenerative changes as evidenced by desquamation of the surface epithelium and loosening of the cells lining the glands. No evidence of inflammation could be found in the mucosa. The difference between this section and those taken from the cardia and the esophagus was most striking.

BACTERIOLOGY OF THE THYROID GLAND IN GOITER¹

BY ANTONIO CANTERO B.A. ROCHESTER MINNESOTA

Special report in Bacteriology The May Foundation

TISSUE bacteriology of the thyroid gland appears to be a new method of investigating the etiology of goiter. Since the work of Farrant and McCarrison there has been no doubt but that a "contagium vivum" plays an important part in diseases of the thyroid gland. These investigators were the first to advance definite evidence of a specific bacterial agent as the cause of thyroid hyperplasia. The constant finding of a mutant colon bacillus in faces of goitrous patients and the results of animal experimentation led these investigators to believe that prolonged ingestion of the bacillus from contaminated waters causes endemic goiter because its toxin affects the thyroid gland. Galli Valerio has shown that goiters can be produced in rats by the injection of bacillus pseudopestis murum isolated from the waters of the Jura Mountains. The bacillus was found to have a specific local effect on the thyroid tissue bringing about tumefaction and abscess formation.

Gilbride in 1911 made a bacteriological study of 14 cases of goiter. He isolated micrococcus tetragenus from the thyroid gland in one case of exophthalmic goiter and streptococcus vermiformis of Sternberg in one case of cystic goiter. In none of the other 12 cases was a growth obtained.

Rosenow in 1914 isolated a diphtheroid non-hemolyzing streptococcus from the thyroid gland in 25 of 32 cases of goiter (mostly exophthalmic goiter) in man and in 8 of 12 dogs having goiter. These organisms when injected repeatedly into dogs over periods ranging from 20 to 70 days produced goiter loss in weight and diarrhoea. In one dog softening pulsation and bruit of the thyroid associated with marked tachycardia and tremor also developed. Microscopically there were noted vacuolization and irregular staining of the colloid within vessels areas of necrosis and a variable degree of hyperplasia.

Clinical evidence of an association between infection and disease of the thyroid has not been wanting. Thus Vincent called attention

to the frequent enlargement of the thyroid gland in acute articular rheumatism. Albertin Bech and Acciote also attributed certain lesions of the thyroid gland to acute rheumatism. Halsted emphasized the importance of infection as the cause of hyperplasia of the thyroid. Beebe found that 40 per cent of the patients with hyperthyroidism gave a history of repeated attacks of acute tonsillitis. Norregaard found localized infections usually in tonsils in a group of 35 cases of goiter. C. H. Mayo also emphasized the relationship between focal infection and hyperactivity of the thyroid gland. Billings reported cases in which goiter disappeared after tonsillectomy.

It occurred to me that the difference in the results obtained might be explained by differences in the technique employed. Gilbride planted pieces of tissue in various mediums which did not afford a gradient of oxygen tension whereas Rosenow inoculated emulsion of the tissue in mediums that afforded not only aerobic and anaerobic conditions but a gradient of oxygen tension.

I used the method of Rosenow in all cases and also the methods used by Gilbride, as controls in selected cases.

TECHNIQUE

Cultures from the tissues were prepared under sterile conditions. Immediately after excision of the gland by the surgeon the specimen with the least handling possible was covered with sterile gauze or a towel and taken to the laboratory. By means of a hot blade a large surface of the gland was seared. With a sterile Pasteur pipette the seared surface was punctured, fluid for culture was drawn and then a portion about 1 cubic centimeter was emulsified. With sterile instruments the tissue was removed by cutting into the seared surface. The excised tissue was passed rapidly through a flame then washed three times in normal sodium chloride solution placed in a mortar in a sterile air chamber and emulsified with normal sodium chloride solution and

terior thoracic wall by the large amount of fluid. The left thoracic cavity showed no adhesions; the left pleura appeared normal, the lung was not collapsed and no exudate was present. The œsophagus was found perforated by a linear incision about 1 inch in length on the right side 2 inches above the diaphragm. There was no blood in the stomach and nothing of interest in other organs.

For microscopic examination sections were made of the œsophagus at the site of the lesion above the lesion and below the lesion from specimens taken immediately after death and repeated from specimens taken after 24 hours of postmortem decomposition *in situ* in the cadaver. Examination of a section through the lesion taken immediately at death showed no indication of inflammatory reaction. The stratified epithelium was intact and the underlying tissue showed neither congestion nor an inflammatory exudate. Sections of the œsophagus taken from above and below the lesion at death showed the same conditions as those found at the lesion. Of the sections from material taken 24 hours after death those below and through the lesion showed no change in the histological picture, that above the lesion showed evidence of degeneration such as pyknosis of the nuclei and disintegration of the cytoplasm.

DISCUSSION BY T. H. WILLIAMS

There has been considerable speculation as to the cause of the rapidly fatal termination in cases of spontaneous rupture of the œsophagus as compared with the protracted and frequently non-fatal course of ulceration into the œsophagus of some tuberculous or other chronic inflammatory nature. The cases so far reported have usually shown at autopsy a large amount of fluid in the pleural cavity which in some cases contained food particles and has been explained as due to the passage of gastric contents through the lesion of the œsophagus into the pleural cavity. This explanation hardly appears to be an adequate one. In both our experimental cases the pleural cavity was filled with fluid but this was alkaline contained no gastric contents, was of the nature of an exudate and teemed with bacteria, while the stomach contained

no similar fluid but on the contrary, a dried curdy mass. The rapid throwing out of this exudate together with the extreme degree of pleural inflammatory reaction seen within 24 hours in these two cases seems to indicate that death is due to a sudden attack by virulent organisms within an undefended closed, and toxin absorptive cavity in which no immunity has been raised. In those cases of slow ulceration into the œsophagus which have been reported as terminating favorably this is prevented by the formation of a protecting layer of granulation tissue.

The presence of this infected fluid in the pleural cavity would suggest that surgical measures are indicated wherever a diagnosis of spontaneous rupture of the œsophagus can be established with any degree of certainty. Pleural puncture and aspiration of the exudate indicated to verify a suspected diagnosis of rupture followed by efficient drainage of the infected cavity might result favorably in those cases in which a simple linear tear of the œsophagus has occurred.

CONCLUSIONS

1. Rupture of the œsophagus is a rapidly fatal condition usually resulting in death in the course of 24 hours.
2. The advanced histological changes in the edges of the lesion found both in our own case and in those described in the literature cannot be explained merely as the result of postmortem digestion. Our experimental work has shown that when rupture of the œsophagus is produced in a healthy animal these changes do not occur.
3. It appears probable that spontaneous rupture is preceded by some inflammatory process which weakens the œsophageal wall.
4. A possible method of surgical treatment for an otherwise hopeless condition is suggested.

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BACTERIOLOGY OF THE THYROID GLAND IN GOITER¹

By ANTONIO CANTERO B.A. ROCHESTER, MINNESOTA
Specialist in Bacteriology, The Mayo Foundation

TISSUE bacteriology of the thyroid gland appears to be a new method of investigating the etiology of goiter. Since the work of Farrant and McCarrison there has been no doubt but that a 'contagium vivum' plays an important part in diseases of the thyroid gland. These investigators were the first to advance definite evidence of a specific bacterial agent as the cause of thyroid hyperplasia. The constant finding of a mutant colon bacillus in faeces of goitrous patients and the results of animal experimentation led these investigators to believe that prolonged ingestion of the bacillus from contaminated waters causes endemic goiter because its toxin affects the thyroid gland. Galli Valerio has shown that goiters can be produced in rats by the injection of bacillus pseudopestis munitum isolated from the waters of the Jura Mountains. The bacillus was found to have a specific local effect on the thyroid tissue bringing about tumefaction and abscess formation.

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TECHNIQUE

Cultures from the tissues were prepared under sterile conditions. Immediately after excision of the gland by the surgeon the specimen with the least handling possible was covered with sterile gauze or a towel and taken to the laboratory. By means of a hot blade a large surface of the gland was seared. With a sterile Pasteur pipette, the seared surface was punctured, fluid for culture was drawn and then a portion about 1 cubic centimeter was emulsified. With sterile instruments the tissue was removed by cutting into the seared surface. The excised tissue was passed rapidly through a flame then washed three times in normal sodium chloride solution, placed in a mortar in a sterile air chamber and emulsified with normal sodium chloride solution and

sand. The pipetted fluid and emulsion were inoculated into the following mediums: glucose brain broth, glucose broth, meat infusion, and soft glucose brain agar (0.3 per cent) in tall columns (10 to 12 centimeters), and plain broth in low columns (3 to 5 centimeters). Dextrose broth in bottles containing 150 cubic centimeters was inoculated with the residue of the emulsified tissue. Anaerobic cultures were made on blood agar slants by the pyrogallic acid method. Aerobic cultures on blood agar plates of the pipetted material and emulsion were also made in some instances, but this was not done as a routine, because the organisms which were being sought required a certain gradient of oxygen tension for their growth.

The glucose brain broth medium was prepared from Difco dehydrated broth to which 0.2 per cent glucose and about the equivalent of 2 centimeters of calf brain with several small pieces of marble were added before sterilization. The glucose brain agar was prepared from meat infusion to which 0.3 per cent agar (just sufficient to jelly) and calf brain were added. The glucose (0.2 per cent) broth, plain broth and agar to which 5 per cent horse blood was added before pouring were made from extract of beef and peptone (Difco). All mediums were adjusted to hydrogen ion concentration 6.8 to 7.2, sterilized at 20 pounds pressure for 20 minutes and clarified by means of a continuous feed centrifuge. In inoculating these mediums I purposely varied the amount of inoculum in order to make the range of oxygen tension and other conditions as wide as possible. The cultures were incubated at 37 degrees C. for from 1 to 7 days and were examined daily.

RESULTS OF CULTURES

Cultures were made of the thyroid tissue from 50 goiters. Most of them were colloid or adenomatous goiters that had existed for a long time. In only 3 cases did the cultures fail to show growth. Positive results were obtained in all of the rest. In accordance with Rosenow's previous findings the predominant flora was found to be of streptococcal morphology. Organisms belonging to this group were isolated in 31 cases. Pneumococci

were present in 5 additional cases. Welch's bacillus in 2, a diphtheroid bacillus bacillus pyocyaneus and micrococcus tetragenus in 1 case each, and staphylococci in 7 cases. Tall columns of glucose brain broth and glucose brain agar, mediums affording a gradient of oxygen tension yielded the highest percentages of positive results: the former yielding growth in 25, the latter in 28 of 34 cases in which the results were tabulated according to mediums. Glucose broth in tall columns gave the next best results, yielding growth in 14. Plain broth in low columns showed growth in only 4 cases. Meat infusion in 5, aerobic blood agar in 4, and anaerobic blood agar slants in 8. The streptococcal growth in broth was often seen to begin in the bottom of the tall tubes and extended to the top in from 12 to 24 hours. The colonies of streptococcus in the shake cultures of the soft glucose brain agar were usually few and were always situated in the lower levels of the medium. Organisms which did not grow on blood agar on direct plating of the emulsions nor in the aerobic part of the shake cultures of the soft agar, would do so on the second or third subcultures. In a few cases this was impossible and the organisms were strictly anaerobic.

Successful cultures of the streptococci on blood agar plates revealed both the green producing and hemolyzing varieties. The colonies of the viridans instead of being pinpoint in size, dry and elevated were fairly large, shiny and only slightly elevated but were surrounded by a typical green halo. The zone surrounding the colonies of the hemolyzing types was usually hazy and narrow in sharp contrast to that of the typical hemolytic streptococcus.

The results from planting pieces of tissue according to the method of Gilbride in low columns of bouillon containing calcium chloride and in salt solution were usually negative and the streptococcus was not obtained.

Morphologically the viridans and hemolytic streptococci appeared much alike and produced short chains of 3, 4 or 5 gram staining cocci of uniform size. Only in a few cases were long chains of 10 to 12 cocci encountered. The diplococcus isolated in 5 cases was gram positive about the same size as the

streptococcus, and in some cases showed a distinct capsule. It produced small pinpoint, slightly elevated colonies on blood agar surrounded by a green zone. It was also highly sensitive to oxygen in the primary culture.

The animal experiments are too few to be of much value but since the results corroborate, in important respects those obtained by Rosenow in this and other fields a brief summary of them is given.

Freshly isolated cultures of the streptococcus in glucose brain broth from 4 cases were injected intravenously into rabbits. One additional strain was injected on isolation after a number of transfers on artificial mediums and one strain after prolonged cultivation and one animal passage. Six rabbits were injected with from 2 to 5 cubic centimeters each of the freshly isolated strains. Of these 5 died from the effects of the injection. A variable degree of hyperæmia and swelling of one or both lobes of the thyroid gland was found in all and was marked in 2. The streptococcus was recovered from emulsions of the thyroid gland in all and from the blood in 4. No gross lesions of the viscera developed. Six rabbits were injected in a similar manner and in like dosage with the streptococci after several subcultures. Of these all remained well and were chloroformed in from 1 to 2 weeks. Only 1 showed changes in the thyroid gland, and none showed lesions in other organs. The streptococcus was isolated from emulsions of the thyroid in 4 and from the blood in 3.

COMMENT

The predominance of the streptococcal flora seems to be of some significance since enlargement of the thyroid gland and true thyroiditis are so commonly noted in diseases that have been shown to be due to streptococci or are associated with localized streptococcal infections.

The discrepancy between the results obtained by Gilbride and Rosenow is explicable on the basis of differences in their technique

From the results of this bacteriological study and experimentation, it would seem that localization of certain organisms especially those belonging to the streptococcal group in the thyroid gland, may be an important factor in the pathogenesis of goiter.

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COMMON MISCONCEPTIONS IN RADIOTHERAPY¹

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AMONG surgeons and internists there is some confusion concerning the relative advantages of radium and X rays in the treatment of many diseases. We often read articles by physicians who advocate X rays in dealing with a certain condition and other articles favoring radium just as strongly in the same disease. Under such circumstances it is but natural that an impression should arise that the two agents conflict, when really they do not.

As soon as the therapeutic value of radium became recognized certain members of the profession hastened to make use of this valuable substance. Some of them were radiologists while others were medical or surgical practitioners without special training in radiology. Some were equipped and trained to use both agents, some to use one agent or the other while others possessing one or both agents had no training. What would be more natural therefore than that the possessor of such an expensive substance as radium should employ it and advocate its use as much as possible or that one with facilities only for X ray treatment should speak or write of it exclusively? Moreover there are diseases or phases of the same disease in which either agent may be used to produce effects more or less similar in character and degree. Thus the sources of confusion and misunderstanding are at once made apparent. By their nature and the circumstances surrounding their production both agents possess certain advantages and disadvantages.

Radium is available in measurable quantities of radio active substance either in the form of a salt (radium element in metal capsules or needles) or in that of a gas (radium emanation in glass capillaries). Its supply however is limited and its cost almost prohibitive. Now radium in whatever form is like all other radiations subject to the inverse square law by virtue of which the intensity of its rays diminishes according

to the square of the distance. Therefore if we apply any unit of radium to the surface of the body and leave it in position long enough to deliver the maximal dose that the skin will tolerate without damage, calling such a dose 100 per cent, the percentage of this dose reaching certain depths beneath the surface will be as shown in Figure 1.

In Figure 1 may be seen a double horizontal line representing the skin, and two sets of circles at different distances from the center of the diagram. In each case the center consists of a unit of radium. In A the radium unit is in immediate contact with the skin. If then a dose is given to the limit of skin tolerance and if such a dose at a distance of 0.5 centimeter from the skin is considered as 100 per cent, the dose at 1.0 centimeter will be only 25 per cent and at 2 centimeters only 6.25 per cent of the surface dose. In B the distance between the unit of radium and the surface of the skin has been increased to 2.5 centimeters. Under these conditions the time necessary to deliver a full dose to the skin is much longer. Moreover the effective dose 2.5 centimeters below the surface (5 centimeters from the radium unit) although much greater than when the radium unit is in immediate contact with the skin is only 25 per cent of the full surface dose.

The percentage of the 100 per cent dose reaching different levels below the surface can be altered by increasing or decreasing the amount of filtration through which the rays have to pass and by increasing the distance between the radium unit and the surface, but such increase involves a longer time of exposure to deliver a 100 per cent dose to the surface. Indeed to attempt any significant increase of the depth dose percentages by increased filtration and distance requires such an increase in the time of exposure as to be wholly impracticable. The only possible way to overcome this obstacle would be to use a larger quantity of radium but its cost makes this prohibitive. Were we not

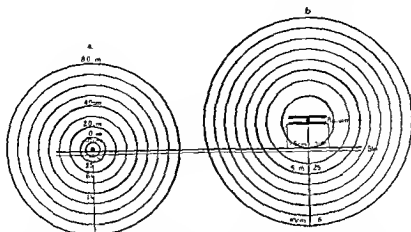


Fig 1 Effect of distance on radium dosage (inverse square law)

hampered by considerations of supply and cost methods might be devised to solve the physical problems. We might even learn how to neutralize the danger of handling such quantities of radium. For the time being however we must adapt our methods to the facilities available and to the physical endurance of our patients.

From the foregoing it can be easily understood why the maximal usefulness of radium is limited to a short radius. The chief indication of radium is therefore for lesions or tumors of limited size on or near the surface of the body or accessible from the outside the extent of which can be determined with a fair degree of accuracy. It is most useful when it can be introduced directly into the substance of the lesion in such a manner as to deliver to every part an adequate and fairly uniform dose. Sometimes the radium can be concentrated in one large unit but generally the implantation method is more effective many units each containing a small quantity of radium element or emanation being introduced at regular intervals throughout the tumor. If the lesion is large or if as in many malignant growths its shape is irregular and its extent ill defined, and especially if it is below the surface radium is not the agent of choice. Under such conditions X rays are more efficacious although in many cases both agents can be combined advantageously. For example in carcinoma of the uterine cervix the indica-

tions for radium are ideal because through the cervical canal the radio active unit or units can be placed in the very center of the diseased area. It can thus exert full action in every direction, with great benefit in many cases yet, on account of the inexorable influence of the law of the inverse square, the maximal effect is limited to a radius of between 10 and 20 centimeters. If therefore, the zone of malignant degeneration extends farther and its outlying elements do not receive sufficient radiation to bring them under control, an attempt is made to compensate for this deficiency by giving X ray treatment from without.

When because of metastasis to axillary and supraclavicular nodes carcinoma of the breast becomes a problem for the radiologist how should it be treated? To attack such widespread dissemination with radium would require a quantity seldom available, because, in order to be effective, it must be used at a distance. The great cost of such treatment would be justified only by a higher degree of effectiveness than we are warranted to expect from past experience. Such cases are best dealt with by means of X rays but it is sometimes possible to increase the effect and shorten the period of treatment by also using radium units buried throughout the primary tumor.

Radiotherapy before and after surgical amputation of an operable carcinomatous breast should be carried out by means of

X rays, because it is essential to irradiate a large territory as uniformly as possible. This would not be feasible with radium unless the quantity was sufficient to enable its use at a distance, like an X ray tube. The same principle applies in the treatment of recurrent or metastatic deposits, because it is naturally and justly assumed that the entire lymphatic drainage is affected.

At short range radium has a more intense action than X rays and this advantage is sometimes most useful. For example when repeated X ray treatment no longer influences superficial carcinomatous nodules, radium may still produce the desired effect. Seldom is the reverse true. This advantage of radium can often be utilized in the treatment of many diseases or of different phases of the same disease. Thus in a superficial recurrence of carcinoma or other forms of malignancy, radium may often be employed with at least temporary success after the effectiveness of X rays has become neutralized by the increasing tolerance of the lesions. But, since radium itself can seldom arrest the activity of malignant cells permanently, it should be reserved until the power of X rays has been completely expended. Control of malignant deposits can thus be maintained for a longer period. This does not apply to solitary foci which sometimes can be permanently overwhelmed by a massive attack with radium.

In Hodgkin's disease and in lymphosarcoma the lymph nodes throughout the body may be diseased. Regardless of the apparent limits it is best at the outset to treat all the main groups of lymph nodes whether enlarged or not including those in the mediastinum and along the dorsolumbar portion of the spine. Such treatment is generally most successful with X rays. In certain cases, however, the enlargement of the nodes in one region may be so great as to produce pressure symptoms which should be relieved as quickly as possible when the greater superficial action of radium can often be brought to bear with good effect but experience has shown that too rapid reduction in the size of such nodes is not always an advantage to the patient. Clinical judgment in

estimating the stage of the disease is an important factor in deciding how intense and how concentrated the treatment should be.

Tumors or lesions deep within the trunk whether thoracic or abdominal are more effectively treated with X rays than with radium and this in spite of the great radio-sensitiveness of certain forms of tumors such as the malignant embryoma or seminoma. This variety of tumor is so sensitive to radiation that even its secondary manifestations yield readily to moderate doses of either X rays or radium. Although striking regression often follows the application of radium to the surface of the abdomen X ray treatment is preferable because the full extent of the malignant dissemination cannot be ascertained and it is essential to irradiate not only the part of the tumor which can be felt through the abdominal wall but also the part in the surrounding tissues.

The choice between radium and X rays in dealing with benign lesions rests on their extent, volume and depth. Small keloids are best treated with radium while X rays are preferable for large keloids. When uterine fibromyomata adjoin the mucosal surface radium inserted into the cavity of the organ is generally sufficient. X rays are more beneficial when the tumors are subperitoneal. But in most cases both agents should be combined because it is so seldom possible to determine the location of the tumors accurately.

STIMULATION

The idea that radium and X rays can stimulate cells is often expressed or implied by physicians. They either believe that such stimulation is actually produced or that it may follow treatment of a malignant tumor and increase its rate of growth. I recently heard two radiologists on the witness stand swear that the action of these agents may be stimulating or destructive. I am quite certain that if these two radiologists had been asked whether they had ever seen evidences of stimulation resulting from radium or X ray treatment they would have promptly answered no. We sometimes hear radiologists speak of a 'stimulating dose' yet if they were to specify the amount of a

stimulating dose of λ rays or of radium, they would be unable to do so. How, then, has such a belief become so widespread and whence has it arisen? Surely there must be some fire to account for the smoke.

The action of radium and λ rays on plant and animal life has been the subject of many experiments. When we scan the printed records we find for instance that when blood is irradiated there occurs within 24 to 48 hours a slight leucocytosis followed by a pronounced leucopenia lasting many days. Arntzen and Krehls have recently shown that when germinating peas are subjected to very small doses of λ rays their growth during the first 24 or 48 hours is slightly more rapid than that of controls but that after this their rate of growth diminishes steadily. Similar results have been reported by almost all experimenters the only variation being that, with larger doses the transient increase in rate of growth does not take place. In nearly all such studies it has been found impossible to prolong this transient phase of apparent stimulation which varies somewhat according to the sensitiveness of the individual plant or animal. Whether experimenting with peas and other plants or with *amœbæ*, frog eggs or other animal forms the mature products have been always either normal or deficient in different respects (generally slow growth and failure to reach full development) no one has ever been able to produce in this manner larger specimens of any variety of plant or animal or to cause them to mature in less time than the unexposed controls. Moreover the results in growing plants and in all forms of animal life are wholly in accord with our experience with radiotherapy in human beings. No one has ever brought forth the slightest evidence in favor of the theory of stimulation in the sense of continued acceleration of cell life. Certainly in my experience there has never been anything which could even remotely suggest such a possibility.

Since early in 1896 the skin of thousands of human beings has been exposed to every conceivable dose of λ rays. Were stimulation by such means possible surely by this time there should have appeared a new race

of men with thick skins and long body hair, but so far as I am aware, the human skin is approximately the same now as it was in 1895. Radium and λ rays may cause the hair to fall out temporarily or permanently, but unfortunately, cannot increase the growth of hair. The activity of the sweat glands also can be diminished by exposure to radiation but no one has thus been able to make them secrete more freely. All the changes resulting from the action of radium and λ rays on tissue cells are degenerative in character. Repeated over exposure may, it is true, cause such degeneration to become malignant. This has occurred in radiologists who have been careless of themselves and a few instances have occurred in patients subjected to the rays frequently and over a long period of time. This is not stimulation in the sense of increased activity, but aberrant function due to chronic irritation. In considering stimulation with reference to the effect of radiation on tumors it has never been shown that the rate of growth of a tumor can be accelerated in this way.

DIRECT OR INDIRECT BIOLOGICAL EFFECTS

The power of an idea is a marvelous thing. Even if the idea is wholly or partially false it is often astonishing how far it will travel before the truth can overtake and either destroy or correct it. When the true explanation of any scientific phenomenon is finally reached its mechanism is generally found to be much simpler than that of most of the hypotheses previously held concerning it. The simple obvious thing is generally the last to be thought of. Too often we forget that a hypothesis is nothing more than a plausible but fanciful, explanation of certain observable phenomena based partly on certain known facts, partly on circumstantial evidence and partly on the law of probability. Too often a quarter or a half truth is seized on and by the generous admixture of an artificial mortar made up largely of wisps of imagination is erected into a figure supposed by representing the truth.

An example of this is seen in the present attitude of many radiologists toward the mechanism of the biological effects produced

by radiation. When living tissues are subjected to λ rays or to radium certain changes follow, and in a definite sequence. If for instance the skin is treated the exposure will according to the dose be followed by epilation by erythema and atrophy, or by ulceration. No one would venture to attribute such effects to anything but reaction to the rays on the part of the tissues thus exposed. Yet as soon as we approach the question of malignancy, the idea is advanced that the biological effect of the rays is caused by the elaboration of protective substances leading to immunity. And this idea once enounced is copied and repeated until the utmost confusion reigns whenever the subject is brought up.

That the body attempts in various ways to neutralize or to limit the activity of malignant cells is undeniable. Evidence indicates that the blood and the tissue juices possess a definite lytic power against tumor cells just as they do against bacteria. There is also substantial evidence that local defensive measures are instituted but these are subordinate to and dependent on the general defense mechanism. Among the local defense measures are (1) differentiation of the neoplastic cells (2) lymphocytic infiltration (3) hyalinization and (4) fibrosis. MacCarty has shown that the malignancy of a tumor depends on the proportional strength of these factors. Murphy and his co-workers have demonstrated that under certain conditions, exposure of a tumor to λ rays tends to intensify the lymphocytic factor of defense.

Cases are occasionally seen in which regression of a malignant deposit in one part of the body after irradiation is accompanied by similar changes in an untreated lesion in a distant region. Although such instances are not common, that they occur at all shows that with the destruction of one element of a malignant process there may be added to the blood or lymph something which may increase the natural power of resistance. Unfortunately experimental attempts to produce such a desirable result have met with but little success. Certainly there is no proof that the systemic defense against can-

cer can be increased by radiation. But admitting that such factors exist and play a part in the pathological physiology of malignant tumors we cannot find in them a satisfactory explanation of the sequence of changes that occur in a tumor after treatment by radium or λ rays. Indeed most of our positive information points to the conclusion that the cellular changes brought about by radiation in the case of malignant tumors are of the same order as those produced in normal cells subject of course to the modifications imposed by differences in cell metabolism peculiar to the type of neoplastic process. Therefore how can we write and speak of their biological effects as being due primarily to an immunity reaction?

On the contrary, a mass of evidence exists tending to show that the major factor in the effect of λ rays or radium rays on cancer cells is a direct one. Mention has been made of the action of such rays on normal skin. It is impossible to see how such effects can be considered in any other way than as direct effects.

In the experiments of Martin and Rogers and of Warren and Whipple in which destruction of the intestinal mucosa followed λ ray exposure under certain conditions how can we interpret such results otherwise than as a direct effect? If this is true of normal tissues what basis have we for believing that diseased tissues behave differently? When proliferated connective tissue is found to have replaced masses of cells characteristic of some form of malignancy why should we consider the proliferation as due to indirect stimulation of connective tissue by the rays when pathology teaches us that such replacement is a universal phenomenon following degenerative processes? Why invoke a mysterious intangible mechanism for which there is no adequate basis when clinical and experimental data support the more simple view that radiation acts directly on the malignant cells tending to destroy them or to interfere with their metabolism and that their disintegration and subsequent replacement by connective tissue follows one of the main laws of general pathology?

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AN EXPERIMENTAL STUDY OF RUPTURE OF THE UTERUS¹

By JULIUS E LACKNER MD FACS CHICAGO

A VAST amount of work on rupture of the uterus has been published during the past 50 years. A careful review of the literature reveals only a clinical study of the many etiological factors involved the pathology the mechanism symptoms and especially the treatment. The object of this paper is to present the findings of a series of experiments on rupture of the uterus in the lower animals to determine the more exact etiological factors in the causation of this condition. It is obvious that human material is not available. The uteri of the lower animals are bicornuate yet the histological structure and physiology are apparently analogous.

While these experiments are not completed, we feel that the data obtained is of sufficient interest to present in a preliminary report. This work has been in progress during the past year in association with Dr S S Schochet.

The first series of experiments were conducted to determine if the type of incision in the uterus was a predisposing cause of rupture in a subsequent pregnancy.

The second series of experiments were designed to determine if the type of suture material played an etiological rôle in rupture of the uterus.

Only these two phases of rupture of the uterus are presented. The many other factors which we are working on will be discussed in a subsequent series of papers.

Thirty two female goats were used in these experiments. We have found that the uterus of this animal is suitable for operative procedures and pressure determinations in this

work. In order to understand more clearly the *modus operandi* of these experiments a brief description of the apparatus and materials is here given.

The apparatus (Fig 1) consists of a pressure tank connected to a one arm calibrated mercurial manometer by means of a calibrated Y shaped connecting tube the arm of which is connected with the uterus of the goat. A spring gauge is also attached to this manometer to estimate roughly the pressure levels in the mercurial arm. A second tube connects the mercurial manometer with a small glass bottle so as to control the various gas volumes in order that the recording pointer in the second calibrated U shaped mercurial manometer will not record higher curves than the size of the smoked drum of the kymograph.

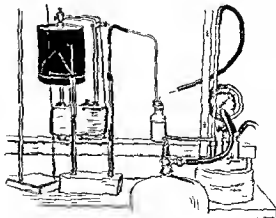


Fig 1 The apparatus

The apparatus which appears of very simple construction required several weeks for completion as we were not able at first to surmount the many difficulties encountered.

Read before the Chicago Gynecological Society, J. 1925. From the Research Laboratories of the National Board of Health, Medical Research, Michael Reese Hospital, and the Laboratory of Pathology, St. Bernard's Hotel, Des Moines, Iowa. For discussion see p. 49.

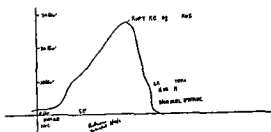


Fig 2 Kymographic tracing of uteri not operated upon

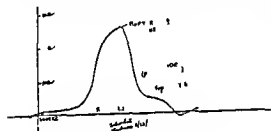


Fig 3 Kymographic tracing of uteri not operated upon



Fig 4 Kymographic tracing of uteri not operated upon

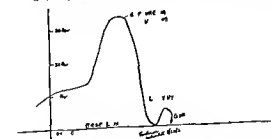


Fig 5 Kymographic tracing of uteri not operated upon

It is obvious that it is necessary to have this arrangement of apparatus to trace success fully pressures varying from zero to 35 pounds per square inch. The mathematical calculations and the hydraulic and gas laws involved in obtaining the correct pressure will be presented by Dr Schochet (see discussion, p 149)



Fig 6 Composite curve of pressures required to rupture normal uteri

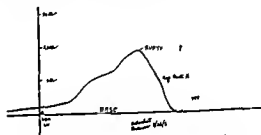


Fig 7 Kymographic tracing of uteri operated upon

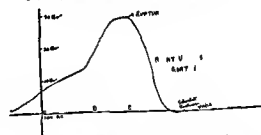


Fig 8 Kymographic tracing of uteri operated upon

The goats were operated upon under strict surgical aseptic conditions. The incisions were sutured with No 00 plain chromic and iodized catgut and the subsequent pressure readings on these uteri were made from 5 to 6 months after operations.

In order to determine whether the type of incision played an etiologic rôle it was necessary to determine the average normal pressure required to rupture the unoperated non gravid uterus. The uteri of 7 goats were tested to determine the amount of pressure per square inch necessary to rupture the uterus. As shown in kymograph tracings the pressures required to rupture a normal uterus

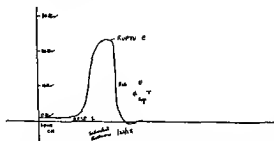


Fig 9 Kymographic tracing of uterus operated upon

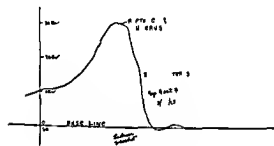


Fig 10 Kymographic tracing of uterus operated upon

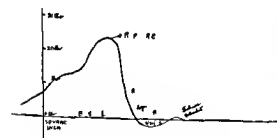


Fig 11 Kymographic tracing of uterus operated upon

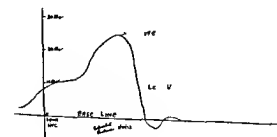


Fig 12 Kymographic tracing of uterus operated upon

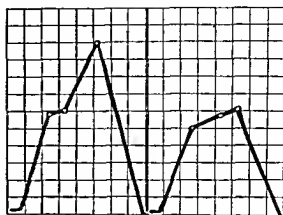


Fig 13 Composite curve of rupture of uterus

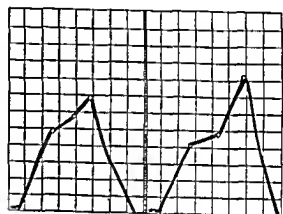


Fig 14 Composite curve of rupture of uterus

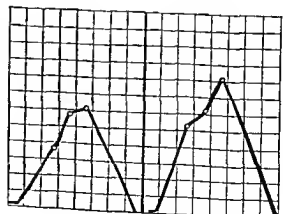


Fig 15 Composite curve of rupture of uterus

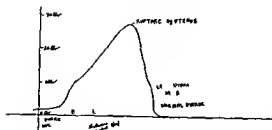


Fig 2 Kymographic tracing of uterus not operated upon

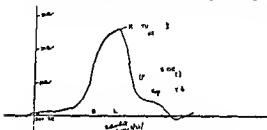


Fig 3 Kymographic tracing of uterus not operated upon

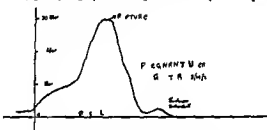


Fig 4 Kymographic tracing of uterus not operated upon

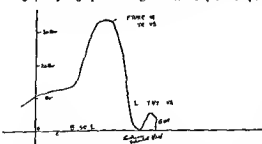


Fig 5 Kymographic tracing of uterus not operated upon

It is obvious that it is necessary to have this arrangement of apparatus to trace successfully pressures varying from zero to 35 pounds per square inch. The mathematical calculations, and the hydraulic and gas laws involved in obtaining the correct pressure will be presented by Dr Schochet (see discussion p 149).



Fig 6 Composite curve of pressures required to rupture normal uterus

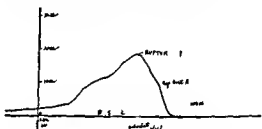


Fig 7 Kymographic tracing of uterus operated upon

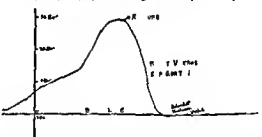


Fig 8 Kymographic tracing of uterus operated upon

The goats were operated upon under strict surgical aseptic conditions. The incisions were sutured with No. 00 plain chromic, and iodized catgut and the subsequent pressure readings on these uteri were made from 5 to 6 months after operations.

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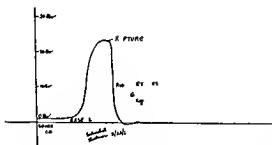


Fig 9 Kymographic tracing of uteri operated upon



Fig 10 Kymographic tracing of uteri operated upon

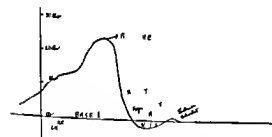


Fig 11 Kymographic tracing of uteri operated upon

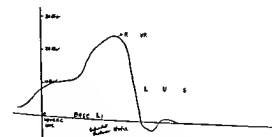


Fig 12 Kymographic tracing of uteri operated upon

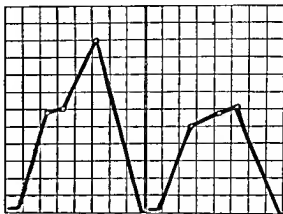


Fig 13 Composite curve of rupture of uteri

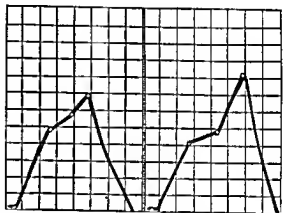


Fig 14 Composite curve of rupture of uteri

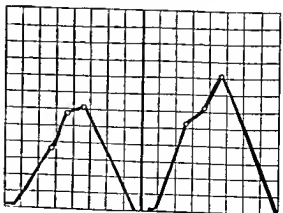


Fig 15 Composite curve of rupture of uteri

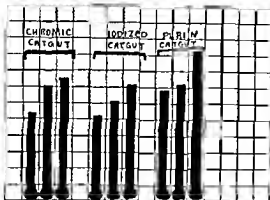


Fig 16 Composite curve of pressures required to rupture uteri

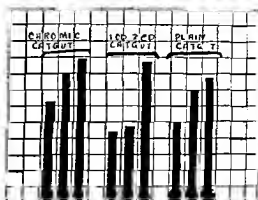


Fig 17 Composite curve of pressures required to rupture uteri

varied from 12 to 32 pounds per square inch (Figs 2, 3, 4 and 5)

However most of the uteri were ruptured by a pressure of more than 22 pounds per square inch

Figure 6 is a composite curve of the pressures required to rupture the normal uterus. This curve was made by using the ordinates of the curves in Figures 2, 3, 4 and 5. The abscissa of the curves were not taken into consideration as this would include the factor of time and the fracture or segmentation of muscle fibers which will be dealt with in another paper. With the establishment of this average pressure or norm required to rupture the uterus of a non gravid goat not operated upon we then proceeded to determine whether the

type of incision and the type of catgut played etiological rôles in the rupture of the uterus. Three goats were operated upon under surgical aseptic conditions. One horn of the bicornuate uterus was incised transversely on its anterior median surface through the serosa, muscularis and mucosa and sutured with plain No. 00 catgut. The horn of the opposite side was incised longitudinally through the three coats and sutured with plain No. 00 catgut. The abdomen was closed. Three other goats were operated upon in a similar manner except that iodized No. 00 catgut was used. In the third group of 3 goats similarly treated chromic No. 00 catgut was used. The abdominal incisions of these goats healed by primary intention. We do not include in this group of 9 goats those that had infected abdominal wounds or those dying from postoperative complications.

At the end of 6 months kymographic tracings were made to determine the pressure required to rupture the uteri of these goats that had been operated upon (Figures 7, 8, 9, 10, 11, and 12). These figures show the kymographic tracings of rupture from transversely and longitudinally incised uteri sutured with plain No. 00 catgut. The pressures necessary to rupture the transversely incised uterus in which plain catgut was used (Fig. 13) were 29, 30 and 37 pounds per square inch, 22, 28 and 31 pounds in the longitudinally incised uteri. As seen in the composite ordinate curve of Figure 14 uteri incised transversely and

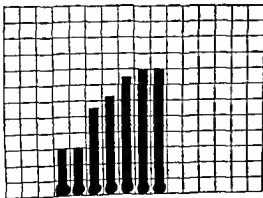


Fig 18 Composite curve of pressures required to rupture uteri not operated upon

sutured with iodized catgut ruptured at pressures of 21, 24 and 30 pounds. The uteri incised longitudinally, ruptured at pressures of 18, 20 and 35 pounds. The transversely incised uteri which had been sutured with the chromic catgut ruptured at 21, 28 and 30 pounds pressure and the longitudinally incised uteri ruptured at 25, 32 and 35 pounds pressure (Fig. 15).

Figure 16 shows a comparative composite curve of pressures necessary to rupture uteri operated upon and incised transversely. A study of this graph shows comparatively very little difference with one exception. With the chromic catgut, the average pressure required to rupture the uterus was 26.3 pounds per square inch. With the iodized catgut the average pressure was 25.3 pounds per square inch. With the plain catgut, the average pressure was 32 pounds per square inch. The higher average pressure obtained with plain catgut is due to the fact that the horn of one uterus required 37 pounds per square inch to rupture. We propose to make a later study of the connective tissue arrangement in the horn of this uterus.

Figure 17 shows a comparative composite curve or graph of pressures required to rupture uteri operated upon and incised longitudinally. The average pressure required with chromic No. 00 catgut was 30.6 pounds per square inch.

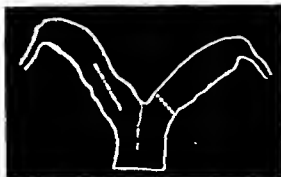


Fig. 19 Diagram to show location of incisions

The average pressure with iodized No. 00 catgut was 26.3 pounds per square inch, and the average pressure with plain No. 00 catgut was 27 pounds per square inch. (Compare with Figure 18 of uteri not operated upon.)

If the pressures of the 9 longitudinally incised uteri with the three different types of catgut are averaged we have a pressure of 27 pounds per square inch. Likewise if the pressures of the 9 transversely incised uteri with the three different types of catgut are averaged we have a pressure of 27 pounds per square inch.

CONCLUSIONS

The pressure required to rupture the uteri of goats operated upon is not affected by the type of incision or the character of catgut employed.

SOME COMMENTS ON THE TEACHING AND PRACTICE OF OBSTETRICS¹

By W. GEORGE LEE, M.D. CHICAGO

Associate Clinical Professor Gynecology and Obstetrics, University of Chicago Visiting Obstetrician Cook County Hospital

IN the curricula of medical schools the time assigned to the department of obstetrics is no more than that given many other departments dealing with phenomena restricted in occurrence, the duration of which extends over a far longer period and in which there is rarely any element of emergency. Moreover in this allotted time there are at present included many phases basically as closely allied to the medical and surgical field as to the obstetrical.

The abnormalities arising in pregnancy of the type demanding attention in prenatal clinics often require as wide a knowledge of essential medical technique as do labor and its problems and the abnormalities seen in postnatal clinics demand surgical knowledge for proper interpretation and care. The importance of medical and surgical knowledge would justify the prevalent limitation of teaching time in the practice of obstetrics if that time allotted to this subject was utilized solely for making understood the phenomena peculiar to obstetrics particularly those of labor. However as much of the time is taken up now by the primarily medical and surgical phases the students in the time remaining cannot obtain a grasp of the normal and pathological obstetrical phenomena and their rational management because basically the physiological phenomena are complex and have a great admixture of mechanical elements and these phenomena are dealt with by the obstetrical department alone.

Obstetrical teaching was the principal topic for discussion at a meeting of this society not long ago. What was the result? If what occurred is taken as an index, there was only a paucity of interest and an absence of ideas adjudged worthy of discussion. Indeed the principal contribution was a laudation of one course of study in detail as already near the zenith of perfection. The inference seemed to be that there was little need for further search for improved methods. This was depressing

for this praised method of teaching obstetrics would appear to be just as capable of improvement as are the curricula and methods of most other medical schools if judged by the product. Information from men in many institutions corroborates the diagnosis of widespread deficiency in obstetrical preparation, whatever the school concerned. The blame cannot be laid upon the students since they show a constantly higher standard of preliminary preparation and mental capacity, and so it must be placed upon the manner and methods of teaching.

Perhaps one difficulty may be that to many teachers all facts seem to have equal value. The student burdened by the great multitude of obstetrical facts thrust into his charge is like the overworked hen trying to brood too many eggs with the result that few hatch because their number exceeds her capacity for keeping them warmed to a germinating temperature. Perhaps teaching departments have been expanded too rapidly like hospitals so that size has outrun organization and efficiency or else like Topsy they 'just growed'. Perhaps the members of other departments of medical teaching are not acquainted with nor appreciative of the needs for carrying on effectively this peculiar yet fundamental department of the science and art of medicine and hence leave us inadequately supported.

More probably however it is the summation of many different causes for which each individual member of this or similar societies who call ourselves gynecologists and obstetricians is in part to blame. It is true that not all of us are teachers in medical schools but every one of us in this field of our especial interest should be an imparter of knowledge about it. We should be teachers of each other, and of those in other fields of medical practice of internes trying to correlate earlier studies by the direct observation and care of actual patients with responsibility for them of students laying foundations in the class

room laboratory and clinic, of nurses and social workers as well as of the public at large. Teaching is of definite value to the one endeavoring to impart knowledge as well as to the recipient of the effort. Right methods and so greatly that our own society would greatly benefit by conscious effort to discover and practice them. It would seem that most of us fail to question ourselves frequently enough about what we know, how available we have our knowledge arranged, and how we can best utilize it. Too much of our time is used in trying to make understood by words alone novel and unshown phenomena. How many medical names mystify the student as well as the layman because in their experience there is nothing to which the strange word can be properly attached? Therefore to show fully or demonstrate should come early and before discussion that is it should come before the shaking apart or analytic phase of teaching.

Oral presentation is of great benefit in that it enables emphasis to be placed on the varying value of facts and permits grouping them in new relationships so that old truths are seen in new vistas and acquire additional interest. Oral teaching should not supplant but should supplement and illuminate the printed word. Obstetrical texts exist in abundance valuable for reference and often encyclopedic. Perhaps they are too voluminous for the classroom and too complex to be grasped by the beginner. Quiz compends also abound to reduce the beginner from the status of student to that of parrot. Is there not a need for handbooks or introductions that will broadly outline the topography of this division of medicine correlate its outstanding features give wide horizons and form the framework which the individual may later elaborate from personal experience and study?

Why should we not standardize more of our technical vocabulary dealing with the definite phenomena and facts of obstetrics? Is it not strange that even here in our society it is often difficult to grasp the exact meaning of technical terms because their use is restricted to one or another teaching group? Why should anyone's vanity prevent the co-ordination of terms and definitions that please him with

those used by others for like things? This society might well be a clearing house for this purpose and certainly students would benefit by having an authoritative list of such synonyms, as would we ourselves for teaching purposes. When there are several differing sets of terms for such basic facts as the relations in space between mother and fetus of which the average student knows only the set preferred by his teacher it is no wonder that misunderstanding results when he goes out from such instruction.

The graduates of all our schools seem to have learned lists of facts without having discussed their interrelationship or usable value. Perhaps hypotheses are too often taught as if they were established beyond dispute. In the recent examination for Cook County internship the obstetrical questions were based upon a definite group of facts assembled to represent a clinical case. It was astonishing how many candidates used these clinical facts merely as a point of departure, springing immediately to some quiz class assemblage of data which they discussed extensively with no further interest in the governing conditions furnished.

I fear we teachers also are to blame in personal example. When a patient arrives at the Cook County Hospital in the third day of active labor with a diagnosis of carcinoma of the cervix (later not confirmed by laboratory findings) with the membranes ruptured for 48 hours with signs of fetal life not obtainable for at least 24 hours (the fetus being later found macerated) with only a 2 centimeter dilatation of the os with a maternal pulse rate of 100 at entrance which continues to rise thereafter and with the fetal presenting part still above the inlet we may I think be justified in speaking of this as a neglected case. If such a case were received from the hands of a midwife or indeed from a general practitioner we would use it to illustrate oft quoted evils but she was received after being 3 days in the care of a well organized teaching dispensary.

Again when from another teaching clinic a patient is received after 24 hours in labor with membranes ruptured but with the os still far from being completely dilated, with a history

of attempted operative delivery by forceps, although the presenting part is still above the inlet, when no valid reason for operative interference is found after her admittance except this unsuccessful invasion of the birth canal, and when she delivers herself spontaneously about 4 hours later with no indication for interference in the intervening time should we be satisfied with our teaching? When a patient after 3 previous deliveries cared for by midwives without noticeable disability resulting passes through a teaching clinic from students upward finally to emerge after laparotomy without her uterus because a laceration in the introitus from an attempted forceps extraction had caused hemorrhage and dismay, should not each of us become diligent in acute observation and analysis, confer about possible improvement and cease throwing stones at those who conscientiously question dictums who want to be shown the validity of new methods before abandoning time tested ones? When recent graduates have frequent unattended births 'precipitate labors' as they delight to call them, because they cannot or do not judge aright the rate of progress in cases relatively normal in all factors who show much greater familiarity with infrequently needed procedures of still disputed worth than with the simple maneuvers almost constantly required does it not behoove all of us to look for adequate correctives for such faulty results?

THE PRACTICE OF OBSTETRICS

The obstetrical division of the Cook County Hospital has 4 visiting staff members each of whom teaches in a different medical school. The service of the house obstetricians is relatively short and there are several different ranks in varying parts of the division but without continuity. These house obstetricians, coming from various schools use different nomenclature and obstetrical procedures. Their services do not overlap so that there is little opportunity to secure continuing uniformity of technique. One result of this is that the records do not lend themselves well to statistical use.

During the residency of Dr J H Gordon from January 1 to July 1, 1924 we attempted

to tabulate and analyze all cases of interest. These were culled from a total of 1263 maternity cases of which 1008 were in Ward 51, 176 were in Ward 50 and 71 were from the venereal segregation ward. In addition there were 13 cases of caesarean section which will be reported later by our fellow member Dr Henry F Lewis, who is making a detailed study over a much longer time.

Before taking up the results of this analysis let me present a tabulation derived largely from statistics obtained from the department of health of the City of Chicago of which Dr Herman N Bundesen is commissioner. These statistics were from a survey of Chicago hospitals instituted by Commissioner Bundesen's advisory committee of prenatal activities. These statistics showed the number of spontaneous and operative deliveries cared for by each hospital during the year 1923. The present tabulation consists of those figures reduced to the rate per 1000 to afford a better comparison. Only seven hospitals are cited chosen both because of the number of patients they cared for and because their obstetrical services are distinct. All seven hospitals are represented in this society. The sum total of all the 74 hospitals included in this survey was reduced to the same basis and added. Our cases at Cook County Hospital have been reduced to the same scale and appended to this tabulation.

NORMAL AND OPERATIVE DELIVERIES IN HOSPITALS

Figures = Number per 1000 Cases

Spontaneous	Low Force	High Force	Caesarea	V. ruo	Extra	Each	Per
	tractio				tie	later	cent
9531	13	3	8	4	4	15	15
263	163	10	26	12	12	10	2
764	184	0	20	20	0	16	4
245	104	13	10	14	12	0	2
837	107	13	13	6	8	5	1
741	174	0	19	0	0	25	0
766	135	0	42	2	15	30	2
761	146	34	19	11	1	14	3
9051	30	7	21	28	4	15	4

(Health Department figures.)

Our own figures as were full used by tabulation.

We realize that the figures in our table give very limited information. The number of spontaneous births in 4 hospitals substantially agree. The rates above the average of spontaneous births at Cook County Hospital

shown on the top and bottom lines may probably be explained by the fact that the women were largely of the European peasant type

The operative births show variations some what dependent upon the personal point of view of the staffs. In low forceps cases the rates vary the lowest rates being in those hospitals with the greatest number of spontaneous births. This may be due to more rigid indications for interference. Certainly in the Cook County Hospital we believe that the number of such deliveries might well be considerably increased if the progress of labor were more closely followed and the obstetrical acumen of the house staff had been sharpened by more efficient preparation. In this tabulation low forceps include also the mid or median type and we regret that this division cannot be shown for it is our belief that true low forceps (outlet forceps with complete internal rotation) imposes far less strain upon the patient than mid forceps in which internal rotation is not as yet completed. The returns for delivery by high forceps show three hospitals in which this operation apparently is taboo, three other hospitals with close agreement in rate while the Cook County Hospital has a still lower record. The rate from the sum total of the 74 hospitals shows such a marked increase over any of these seven that our interpretation would be that the station of the head was not well known in many cases in other words that difficult mid forceps may have been included in the high forceps classification. The cesarean section rates show three hospitals with rates far above the other four and the lowest rate is in exact agreement with the average from the total 74 hospitals. The highest rate occurs in that hospital with the smallest number of other methods used for delivery when the presenting part is still above the inlet. In version two hospitals are markedly above the others in rate as well as above the average of the 74 hospitals and our appended figures for the series we are reporting is the highest of all. The rates of the seven hospitals based upon the total number of high forceps cesarean section version and extraction cases vary very little.

Three hospitals show the same number of extractions and versions which is what we

would expect. One hospital shows no extractions following versions, while two hospitals show such an increased number of extractions that our interpretation is that the questionnaire was misunderstood for these same hospitals show a correspondingly decreased rate of breech interferences. The rates for breech interferences show that in the smaller hospitals there must be less hesitation in interfering with spontaneous progress. Destructive operation rates show two hospitals that exceed the general rate of all 74. When we remember that these 74 hospitals include a large number absolutely forbidding destructive operations unless the fetus be assuredly dead, it would seem that some explanation should be forthcoming to account for this high rate. In one of these hospitals no high forceps were used, perhaps this is the explanation of the increased number of destructive operations. The other high rate occurs in our series and later will be considered in detail.

We now come to our particular series and it may be of interest to show the basis of our analysis

SCHEME USED TO ARRIVE AT FIGURES SHOWN IN TABLE

Servey
Name

PREGNANCY

Date delivered
Race
Duration
Pelvic measurements
Interspinal
Intercostal
Intertrochanteric
External conjugate
Diagonal conjugate
Type of pelvis and degree of disproportion
Presenting part
Position
Station
Systemic complications i.e. cardiac toxæmia etc

LABOR

If onset induced method
Character of uterine contractions
First stage
Second stage
Duration
First stage
Second stage
Third stage
Total

Placental birth
 Spontaneous
 Expression
 Manual removal
 Subsequent uterine treatment

Laceration or episiotomy
 Repair
 Result

COMPLICATIONS OF LABOR

Lack of progress
 Stage of delay
 Inertia of uterus
 Rigid cervix
 Bag of waters unruptured after first stage
 Bag of waters ruptured early first stage
 Dry labor
 Oligohydramnios
 Polyhydramnios
 Constriction ring
 Abnormal presentation
 Threatened rupture of uterus
 Maternal hemorrhage
 Antepartum
 Intrapartum
 Postpartum
 Signs of exhaustion
 In mother
 Uterus
 Pulse
 In fetus
 Meconium
 Heart tones
 Caput succedaneum
 Forelying funis
 Prolapse of funis

OPERATIVE DELIVERY

Hours in labor
 Clinical—Stage of interference
 Condition of cervix
 Dilatation of os
 State of bag of waters
 Station of presenting part
 Operation preparatory to extraction
 Delivery operative method
 Anesthetic used and duration
 Immediate maternal result
 Remote maternal result

CHILD

Cord about neck
 Short cord
 Asphyxia
 Livid
 Pallid
 Resuscitation method
 Injury or deformity
 Final result
 Sex
 Weight

REMARKS ON PUERPERIUM

The arrangement shown in our schema has proved of great interest to us and we suggest its careful consideration by others. If in each hospital a summary of all labors were entered on such a form as soon as each labor was finished and particularly if the different varieties of delivery were separated and on distinct sheets a mine of information would be quickly amassed having great worth especially if the terms therein were standardized so that they represented like things.

Out of the 1268 cases already mentioned 22 were delivered by low forceps, 15 by mid forceps and 9 by high forceps, 35 by version and extraction. There were 20 breech presentations in which manual extraction was done. There were 15 breech presentations in which some manual aid was given and 1 in which birth was completely spontaneous. There were 6 pubiotomies done, 5 destructive operations on the offspring and 13 cesarean sections. Of 8 pairs of twins one pair required operative delivery. There were 86 protracted labors of over 4 hours duration but with spontaneous birth.

The 122 operative interferences gave a percentage of 9.5 which coincides with the tabulation rate already made in comparison with the other hospitals, 67 (5 per cent of the total) were of serious nature. In the protracted yet spontaneous labors numbering 86 cases 58 were in primiparae, in 55 the fetus was in occiput left anterior position, in 11 the pelves were justo minor in type, in 1 justo major, in 7 flat and in 2 there was high blood pressure. There were 3 cases of lues, in 2 of which the fetus was macerated. Among the abnormal conditions were 84 cases of delay in the first stage and 2 in the second stage delay occurred in 53 with the head distinctly high. The cause of delay in 47 cases was inertia, in 9 cases signs of maternal exhaustion as indicated by rising maternal pulse. There were rigid cervixes in 4 cases, dry labors in 15, rupture of the bag of waters early in the first stage in 9 and oligohydramnios in 14. Four babies showed marked caput succedaneum. Four episiotomies were done and there was one tear of the second degree. There were 2 cases of artificial rupture of the bag of waters, 1 of dilatation by hydrostatic bag and 1 of

manual rotation In 11 cases scopolamine morphine was given to banish memory, in 6 small doses of morphine during the labor and in 1 digitalis (We would call particular attention to the number of cases of oligohydramnios because we have found this condition a fertile source of delay In our opinion it exceeds dry labor in importance because it has received scant attention and therefore is rarely diagnosed although it results in the same difficulties that dry labor may cause) Of 2 cases delivered spontaneously 1 was admitted after attempted delivery by high forceps outside The pelvis was flat in type and the maternal pulse rather high and the head was already well advanced The baby died in 6 days from a depressed skull fracture which was elevated after birth The other patient came in in active labor with a face presentation and near the end of the first stage The face was converted to a vertex and the birth of a 10 pound baby in good condition occurred without further delay In several cases the labor was of considerable duration The only reasonable explanation is that the condition of both mother and child remained good throughout for no fetal or maternal deaths resulted I may here note that all scopolamine morphine cases reported are from one service

Low forceps cases in this series are those in which internal rotation was complete so that the obstacle to progress was either bony or soft tissue of the outlet One of these low forceps was secondary to pubiotomy Of the 11 primary low forceps 15 were in primiparæ All had complete effacement and dilatation of the os and there were no fetal deaths The one maternal death in the series resulted from spinal anesthesia and the delivery of the child by forceps was done only because and after the mother was in *extremis* Other factors of interest cited in the records are no co operation of the patient 1 rigid perineum 3 high blood pressure 1 cardiac pathology 1 pelvis flat in type 1 and justomnior 1 In all cases there was second stage delay In addition 1 prolapsed arm and 1 manual rotation received necessary preliminary treatment There was one case in which the occiput was posterior from mal rotation The cases showing inertia were 2 early rupture of the mem-

branes, 2, dry labor, 2, oligohydramnios, 2 postpartum hæmorrhage 2 signs of maternal exhaustion, 11, of fetal exhaustion 4, 8 episiotomies were done and there were 5 first degree tears

Of the 15 mid forceps cases 1 was secondary to pubiotomy In all of the 14 cases of primary mid forceps the cervix was effaced but in 2 dilatation of the os was not complete when interference was started Of the 14 13 were primiparæ, there was 1 cardiac case 1 complicated by dermoid cyst and 1 by multiple fibroids One was the first of twins There were 3 deep arrests, 2 had justomnior pelvis

Complications in labor There were no inertia cases no dry labors in 3 the membranes ruptured early in the first stage in 5 oligohydramnios was present Signs of maternal exhaustion occurred in 11 of fetal exhaustion in 2 One episiotomy was done in 3 cases there were first degree tears and in 2 second degree tears The average duration of the low forceps cases was 18 hours first stage, 2 hours 20 minutes second stage, 20 minutes third stage The average duration of the mid forceps cases was 21 hours first stage, 2 hours 12 minutes second stage, 16 minutes third stage To bring together the less serious interferences and the spontaneous abnormal cases we will add 16 breech presentations In 1 breech case with spontaneous delivery and a macerated fetus toxæmia developed Of 15 breech cases receiving some assistance 10 were primiparæ 5 cases were of the footling variety and in 2 of the cases the babes were macerated

We now come to that 5 per cent of serious interferences There were 9 high forceps deliveries 1 secondary to pubiotomy Of the 8 primary high forceps cases, 1 was a primipara, 1 was a 'neglected' brow with an undiagnosed papyraceous twin weighing about 2½ pounds In 3 the pelvis was flat in type in 2 there was delay in both first and second stages in 5 cases in the first stage and in 1 case in the second Inertia was present in 2 dry labor in 2 oligohydramnios in 4 polyhydramnios in 1 Postpartum hæmorrhage needing subsequent intrauterine packing occurred in 2 signs of maternal exhaustion in 5 and of fetal exhaus-

tion in 2 2 episiotomies were done and in 2 there were first degree tears. Apart from the neglected case 2 fetal deaths resulted. One was a 12 pound baby, and 20 minutes were lost in delivering the shoulders the other was an 8 pound baby delivered with occiput posterior. The mother had received scopolamine morphine anesthesia and had worn an abdominal belt for 2½ hours to assist expulsive efforts. Inasmuch as the case of neglect resulted in maternal death in 7 days from general peritonitis and in the baby's death in 2 days and delivery was by the author further details are given. After 30 hours' labor in an outside teaching clinic the patient was admitted to Cook County Hospital upon another service where she received scopolamine morphine anesthesia for 7 hours. At this time I was asked to see the case. The presentation was longitudinal but the presenting part supposedly vertex was found to be a brow presentation. The uterus had been dry on admission. At this time there was complete effacement of the cervix but a dilatation of only 4 centimeters. Manual dilatation preceded the conversion of the brow to a face for the retraction of the uterus prevented successful extension of the head. A very slow extraction was done thereafter for our belief is that the real impediment to fetal exit from the uterus could be safely overcome only by turning out the constriction ring. After this tedious part was accomplished extraction through the bony pelvis occurred without incident. The papyraceous twin was delivered 20 minutes later in an intact and distinct sack. The fetal head was markedly molded from its long stay as a brow but only livid asphyxia was present. The postmortem examination of the mother disclosed no injury of the uterine walls.

There were 35 cases of version followed by manual extraction 13 of these patients were primiparae 19 multiparae 3 unspecified. There were 6 cases of antepartum bleeding, 3 from placenta praevia marginalis 1 from placenta praevia centralis 1 from ablatio placentae and 1 from cervical laceration. In one of the cases of placenta praevia marginalis in which the pelvis was of the justomino type the fetus presented transversely with a prolapsed hand. There were 7 other transverse

presentations, 2 with a prolapsed arm and 1 with a prolapsed cord. There were 2 cases with brow presentation 1 case of toxemia 1 of eclampsia, and 1 with signs of maternal exhaustion. One was the second twin. Two pelvises were justomino in type and 3 were flat.

The complications of labor include 4 cases of inertia, 2 dry labors, 3 cases of early first stage rupture of the membranes, and of constriction rings. In 5 there was threatened uterine rupture.

The method of treating the antepartum hemorrhage varied, although all were first stage interferences. In 2 cases of placenta praevia marginalis the bag was inserted and 1 live baby delivered. In 2 cases of Braxton Hicks version 1 baby survived but in the other, a case of placenta praevia centralis, the baby died. In the 1 case of ablatio placentae a bag and a Spanish windlass were used and the baby was dead. In 1 case in which the bag and manual dilatation of the cervix were used the baby was macerated. Of all other cases in the series 2 babies died in 2 days 1 baby died in 4 days 1 baby was macerated and 1 baby (in the eclamptic case) was dead when received. Three placentae were manually removed.

We think it only fair to discuss the reason for this large percentage of version and extraction cases actually 35 in number because out of these 35 cases 21 are chargeable to one service the remaining 14 being distributed as equally as possible among the other three services. Twenty of the total number of cases show the classical reasons for interference. Of the remaining 15 all on one service, the reasons for version are not very clear from the records unless one postulates a predilection for this method of delivery. In all of the 15 cases there was skull presentation in 11 a posterior position of the occiput in 2 inertia in 8 ruptured membranes in 1 a dry labor with a constriction ring after an initial polyhydramnios and here interference was instituted after 56 hours of labor. The mother was in poor condition after delivery but recovered the baby was one of those who died in 2 days. In 6 of the 15 interferences manual dilatation before version was done in the first stage. We believe we are not misrepresenting conditions

when we state that the one service in which this last group occurred is headed by an avowed admirer of Potter, and in addition we may say that on this same service were all the cases receiving scopolamine morphine or twilight sleep as well as all pubiotomies but one. There the resident in an emergency elected to follow this method. This should be borne in mind when the pubiotomies are analyzed.

The primary manual extractions which occurred in 23 breech cases show the following items of interest. There were 6 footling extractions, in 2 cases there was a prolapse of the cord and in 14 cases, breech presentation one with prolapse of the cord. There were 10 primiparae and 10 multiparae 2 toxæmia cases 2 dead fetuses with heart tones not having been heard during the labor 1 case of intrapartum hemorrhage from ablatio placenta occurring before entrance to the hospital 1 of postpartum hemorrhage in 5 cases there were signs of maternal exhaustion in 1 of fetal there was 1 case of inertia 1 with early rupture of the bag of waters. Of the other 3 dead babies 1 death was the result of ablatio placenta 1 the result of marked delay in getting down the feet 1 was a case of pallid asphyxia with a cleft palate as already mentioned in 2 no heart tones were heard at any time in the hospital 1 fetus being macerated. There was 1 manual removal of the placenta. The most severe of these cases from the maternal standpoint was the one of ablatio placenta. This patient was received in very poor condition but recovered.

Pubiotomy was performed in 6 cases in 2 before the approach of labor. One of the 2 patients was afflicted with tertiary lues in the other the pelvic measurements in centimeters were interspinal 21 5 intercrural 23, intertrochanteric 27 5 external conjugate 18 transverse conjugate 11 5. She had an easy and rapid delivery of a 5 pound 14 ounce baby. In the other case of spontaneous delivery the pelvic measurements were interspinal 22 intercrural 24 intertrochanteric 31, external conjugate 19. The weight of the baby was 5 pounds 3 ounces. All 3 of these patients were primiparae. In the fourth pubiotomy the measurements were 22 26 30 and 19 the patient was a u para the baby weighed

5 pounds, 10 ounces and required mid forceps to complete delivery. The fifth was also a u para, with measurements of 22, 23, 29 18 5 and diagonal conjugate of 11 centimeters. The baby weighed 6 pounds, pubiotomy was done about 9 hours after the onset of labor and the baby was delivered by high forceps 7 hours later. This patient had scopolamine morphine.

The emergency case in which pubiotomy was done was a u para who was brought to the hospital after 24 hours of labor with face presentation and fetus high in station. The diastolic blood pressure was 185 systolic, 130. There were present marked oedema, respiratory infection and a "toxic adenoma." The measurements were 25 28 29 18, and 10. Under either the face presentation was converted to a vertex and then a high forceps extraction was attempted. After $\frac{3}{4}$ grain morphine had been given, and the patient had rested for 3 hours, a pubiotomy was done. Low forceps were used for final delivery. A 6 pound child was born in pallid asphyxia but neither mother nor child survived long.

The destructive operations numbered 5 in this series with one maternal death. The death occurred in a primipara with a breech presentation and a true conjugate of 10 5 centimeters. She was suffering from eclampsia, hypertension nephritis cardiac decompensation and very marked obesity. No fetal heart tones were obtainable. She was admitted after having been in labor almost 2 days and in very serious condition. At the time of interference marked signs of maternal exhaustion were present. The os was incompletely dilated therefore a preliminary dilatation by a Voorhees bag was followed by manual dilatation. Embryotomy was followed by craniotomy done on the after coming head. The mother died 4 days later.

The other 4 destructive operations were done by the writer. Three were craniotomies, one done upon a hydrocephalic baby from whose head 500 cubic centimeters of fluid was obtained after 42 hours labor in the care of a midwife. This case showed signs of threatened rupture of the uterus a Bandl's ring being apparent. There were signs of maternal exhaustion, the pulse being 130 when patient was

admitted. Maternal recovery was uneventful. The other 2 cases of craniotomy followed tentative traction by high forceps. One was a case of dry labor, with signs of maternal and fetal exhaustion. The first stage of labor had lasted 68 hours with a dilatation of the os of only 5 centimeters. She was a vi para, with measurements of 26, 28, 30, 17, 5 and a true conjugate of 11.5 centimeters. The fetal head was unyieldable from excessive ossification. Craniotomy resulted in maternal convalescence without incident. The remaining craniotomy was done after labor had lasted 37 hours, the head was still high and the fetal heart tones had disappeared. Maternal recovery was uneventful although the pulse was 110 at the time of interference.

All these cases may be fairly called neglected, being received in very bad condition. The final case must also be so classified although the neglect was in part ours. Faulty diagnosis of the presentation resulted from too long use of rectal examination alone. This was a primipara with normal measurements having an active gonococcal infection as well as a pronounced growth of condylomata around the whole introitus. A diagnosis of footling presentation was made by rectal examination. Early rupture of the membranes had occurred before entrance into the hospital. Lack of progress for 14 hours thereafter with a rising fetal heart rate finally resulted in

a vaginal examination and at this time the true diagnosis was made of a transverse presentation with a hand over the os. When I saw the case, the uterus was tightly retracted upon the fetus and the fetal heart tones were abnormally high. A decapitation was followed by a craniotomy. The weight of the parts of this baby after delivery was 8 pounds. The mother had an uneventful convalescence.

CONCLUSION

In conclusion I would call attention again to the fact that at Cook County Hospital we have to receive patients in every stage of labor no matter how serious the condition and that the total number of neglected cases forms a very considerable factor in our operative results and to point out as well that no control is possible over individual practices of the attending staff on the different services. Under such conditions we think that this analysis and the results shown will conclusively refute the popular belief formerly so widespread that at the Cook County Hospital operative interference is often done without proper indication and is resorted to vastly more frequently than in hospitals under private control. We think that this report shows convincingly that as a whole the Cook County services are decidedly conservative and that in general the indications for major operations are definite and valid.



SAMUEL H. GROSS
1831-1880

MASTER SURGEONS OF AMERICA

SAMUEL W. GROSS

IT is a common observation that distinguished men seldom have distinguished progeny and this unfortunately applies to medicine as well as to other walks in life. In literature occasionally the mantle of the father has fallen on the son and has been worn gracefully but such cases are exceptional. In American medicine we have a few instances particularly in Boston and Philadelphia where ability, diligence and ambition seem to have been inherited by or inculcated in a second or even a third generation but as a rule the sons of a distinguished father are contented to live and die in a reflected glory.

Most men who have risen to great heights in their profession have done so not only in spite of but because of handicaps and obstacles the most common being poverty and a lack of preliminary education. Naturally one of the objects in the life of such men is to remove these hindrances from the path of their offspring so that their ascent may be rendered less arduous. Human nature unfortunately seems to be so constituted that effort is born largely of necessity and material comforts stunt ambition and initiative. Wealth is consequently the poorest inheritance a father can pass on to a son unless with it goes a love of knowledge and a sense of responsibility. Undoubtedly something worked for and attained be it wealth or knowledge or accomplishment has a higher value and is more stimulating than the same thing easily procured.

It is a pleasure therefore to contemplate the life of a distinguished son of an equally or more distinguished father and that is the object of this brief review of the skill and accomplishments of Samuel W. Gross. The life of the Elder Gross has recently been set before the readers of this journal by the inimitable J. Chalmers Da Costa and the present writer recently endeavored to present him from a little different angle.¹ It is hard to write of the son without constantly thinking and writing of the father who was for so many years the most distinguished and most honored American surgeon. The father overcame his environment and grasped his opportunities the son profited by his environment and appreciated his opportunities. A consubstantiation of the two lives together can only produce the conclusion already mentioned that knowledge and accomplishment attained by constant struggle are apt to lead to greater heights than those come by easily.

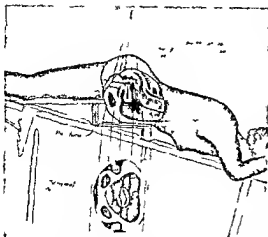


Fig 1. Partial knee-chest posture for pelvic roentgenography after pneumoperitoneum (From Peterson)

induced upon the X ray table the partial knee chest posture was arranged and stereo roentgenograms were made. A diagnosis was made independently by the roentgenologist from the roentgenographic evidence alone. After a joint study and discussion of the films the clinical and roentgenological evidence was correlated. In the operative cases the diagnosis was finally checked up when the abdomen was open. The interpretation of the films was indeed the most difficult part of the investigation and we confess to many errors in our early diagnoses. With greater exper-

ence we are becoming more familiar with the roentgen aspect of pelvic conditions and we are often surprised at how readily we now recognize certain pathological conditions, and how much oftener we agree.

By using the Potter Bucky diaphragm we have obtained even greater detail than did Peterson and in addition to the uterus and ovaries we visualized in some cases the normal fallopian tubes round and broad ligaments bladder and adhesions.

The following conditions have been compiled from our pneumoperitoneal diagnoses

	Cases
Normal genital status	12
Hypoplastic uterus	2
Immature uterus	2
Bicornuate uterus	1
Uterus duplex	1
Displaced uterus	7
Ventrally fixed uterus	2
Early pregnancy	10
Ectopic pregnancy	2
Pseudocystis	2
Fibroids	8
Ovarian cyst	13
Papillary cystadenoma of ovaries (malignant)	1
Tubo-oophoritis	5
Chronic salpingitis	0
Frozen pelvis	1
Adhesions	24

We failed to obtain diagnostic films in 2 cases because the gas was injected subperitoneally wholly or partially. These were in



Fig 2 a. Drawing showing normal genital status in patency test for sterility

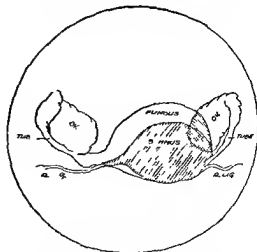


Fig 2 b. Diagram of Figure 2 a showing normal genital status in patency test for sterility

'The Younger Gross' as he was commonly called was born on February 4 1837, graduated in medicine at Jefferson Medical College in 1857 was made professor of surgery in this institution on the resignation of his father in 1882 and died of pneumonia on April 16 1889. Like his father he was a great teacher taking his responsibilities seriously and not using his position as a simple means of displaying his skill as an operator. He probably was a more brilliant operator than his father but like him and all other great teachers of surgery he laid the greatest emphasis on pathology diagnosis and judgment.

His most striking and lasting contributions to surgical literature were those dealing with surgical pathology and his practical contributions were based largely on his pathological studies. Those which stand out most prominently and which are still quoted today are his articles on bone sarcoma and his monograph on

Tumors of the Breast all of which may be considered masterpieces. Ewing in his *Neoplastic Diseases* says that 'Gross's description of the origin structure, clinical characteristics and treatment of bone sarcoma stands today as the classic contribution on this subject. In insisting upon the comparatively benign character of the giant cell sarcoma he did not hesitate to oppose the generally accepted views of Billroth.

Our modern operation for carcinoma of the breast we owe largely to Gross as it was he who more than 40 years ago practiced and insisted on the wide excision of the skin and the invariable dissection of the axilla. His operation has been called the dinner plate operation because the skin incision corresponded to the periphery of the breast. He always removed the sheath of the pectoralis major and sometimes a part of this muscle. He also advised resection of the axillary vein if small adherent glands could not be removed from it. This complete operation which he recommended and which is now looked upon as absolutely essential was opposed by many of his contemporaries on the Continent in England and in America. There can be no doubt that his masterly contributions to this subject caused the abandonment of the incomplete operation which was being done everywhere. His own late results compare favorably with those obtained today.

His work on tumors exhibits many resemblances to the writings of his illustrious father. It shows a careful study of the life history of disease a thorough knowledge of pathology of anatomy both gross and histological and on these are based the treatment he recommends.

Gross was greatly interested in the diseases of the genito-urinary tract and he wrote repeatedly and extensively on the subject of 'Sterility in the Male'. In this connection it is interesting to note that he died childless although his widow, who later married William Osler gave birth to two children.

The 'Younger Gross' was a great surgeon a scientific and progressive surgeon. His death at the age of 52 was a great loss. His contributions however to surgical literature will long outlive the memory of the man.

JOHN H. GIBBON

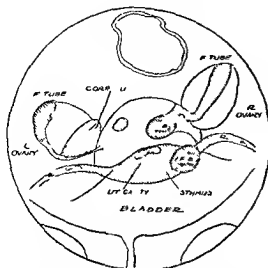


Fig. 6 Multiple fibroids retained ovum. Clinical picture of ectopic pregnancy. Tubes & fundus normal in film.

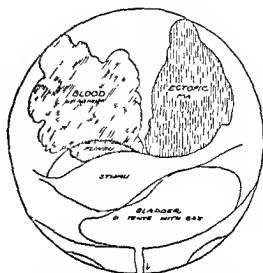


Fig. 7 Ruptured ectopic pregnancy. Patient very obese. History and physical findings confusing. Film diagnostic.

formed. She was a nurse, age 29, single, and complained of pelvic pain. There was no history of a previous inflammatory process. Examination revealed a firmly fixed retroflexed uterus, adherent to bilateral pelvic masses which were firm and tender. The clinical picture was not that of an acute process. The films clearly reveal bilateral tubal swellings and an apparently enlarged adherent uterus. The magnification of the uterine shadow, produced by its retroposition, having been considerably farther from the film than normal. Salpingectomy and Gilliam's round ligament suspension of the uterus were performed.

CASE 5 Fig. 6. This patient was a young woman, age 26 years, who had one child 5 years ago with an uneventful interval history until the present complaint. Her last menstrual period was 9 weeks ago. She felt well until 2 weeks ago—3 weeks after the missed period—when she began to bleed. This was at first just a spotting, and it was accompanied twice by fainting. Pain had not been severe but there was a constant low backache and some left-sided abdominal pain. Upon examination the uterus was found to be erect, slightly enlarged and softer than normal, irregular in consistency and the left adnexa extremely tender, soft but not palpably enlarged. Palpation was made very gently to avoid rupture. When the patient was informed that the impression was that of an ectopic pregnancy, she informed me that she had been to two obstetricians previously and that both had diagnosed the same condition. She wanted to know how one could be more positive however before submitting to surgical exploration, consequently transabdominal pneumoperitoneum was induced and pelvic roentgenograms made.

The interpretation of these films was by no means simple for although the uterus and both adnexa show clearly on the films only by studying them stereoscopically did we come to the diagnosis of uterine fibroids and probable normal adnexa. In view of the acuteness of the disturbance however, and the previous opinions rendered it was deemed advisable to explore the pelvis. At operation the adnexa were found entirely normal. The left ovary contained a recent corpus luteum. The uterus was enlarged and contained several intramural fibroids from 1 to 2 centimeters in diameter which were removed. One seemed to be submucous and in an attempt to isolate the latter nodule the uterine cavity was opened and it was found that this supposed fibroid was a piece of necrotic ovular tissue about $\frac{1}{2}$ centimeter in diameter. This then explained the lapsed period and the recent corpus luteum found at operation as well as the metrorrhagia. The patient denied however that an abortion had been performed or that any material resembling the ovum had passed previously.

CASE 6 Fig. 7. A woman 30 years of age who had been bleeding continuously and more or less profusely for 4 weeks came to the hospital solely because of this hemorrhage. Her previous menstrual history was uneventful and she had not missed a period. She was very obese so that rectal examination revealed little except pelvic tenderness and a sense of fullness. Subjectively there was some abdominal pain of an indefinite nature, weakness but no definite symptom complex. There was nothing at all suggestive of pregnancy in her history. Inasmuch as the history and local findings were indefinite it was decided to seek roentgenographic aid.

DERMATOLYSIS

A REVIEW WITH REPORT OF A CASE

By HERMAN GOODMAN M D B S AND EUGENE F TRAUB M D B S NEW YORK CITY
 From the service of Dr. Charles M. Williams

THE subject of dermatolysis is a complicated one. Under this title a number of abnormal skin conditions have been described in the literature and reviewed in textbooks. Recently we have observed a case which we considered an example of the localized or circumscribed form of dermatolysis and we are taking this opportunity of reviewing dermatolysis and describing our own case both clinically and histologically.

Dermatolysis is regarded as a rare disease. It is variously known as loose skin, cutis laxa, cutis pendula, pachydermatocele and chala-zoderma. The partial or circumscribed form of dermatolysis is characterized by areas of hypertrophy and looseness of the skin and subcutaneous tissues. The affected area of skin may hang in loose folds or be sufficiently elastic to allow of stretching. The appearance of the surface of the integument may be normal, hyperpigmented with dilated and gaping follicles or comedones. The skin is usually thickened but exceptionally it is thinner than normal. On palpation one gets a doughy or velvety soft feel of a greasy uneven surface. The sensation may be unaffected or hypersensitive. There are no subjective symptoms. Although any part of the body may be affected the locations most frequently involved are the face especially the eyelids, the neck, the abdomen and the genital region. The condition is somewhat progressive. After reaching a certain stage of development it may remain stationary.

The etiology is unknown. In certain instances the condition is congenital in others hereditary (several generations) but usually it is acquired. The starting point may be the site of former trauma and the vague term of 'trophoneurosis' has been applied to the causation.

The diseases which may be confused with dermatolysis include diffuse dermatolysis or cutis hyperelastica. The "elastic skin" or

indiarubber man of the circus side show is an excellent example of this form of dermatolysis. Here the integument is generally loosely attached to the subcutaneous tissue and has the property of great distensibility occurring normally in the young of certain animals as kittens. Diffuse dermatolysis has been studied by a number of observers.

Dermatolysis must not be confused with the relaxation of the skin and subcutaneous tissues encountered in senility and after pregnancy. In both of these hypertrophy of the constituents of the skin is lacking. Navi and sebaceous cysts are readily distinguished by the absence of the features of true partial or circumscribed dermatolysis. The relaxation and hanging in folds of the skin are features of pseudoxanthoma elasticum, but associated papules and plaque are absent in dermatolysis. Whether or not to include fibroma pendulum in the group of circumscribed dermatolysis is indeed a problem. We consider that the pre-existent tumor is not a feature of localized dermatolysis and on this ground exclude fibroma pendulum as well as the depressible fibrous tumors associated with so-called von Recklinghausen's disease and the benign multiple new growths of Schwenninger-Buzzi.

The histological features of partial dermatolysis are hypertrophy of all portions of the skin especially an increase in the fibrous bundles. The subcutaneous tissue shares in the general hypertrophy.

There is no tendency to spontaneous involution. Treatment is purely surgical. There is no tendency to recurrence.

Examination of the prepared sections from our case revealed that the greatest abnormality existed in the derma. It was markedly broadened. Swirls of loose fibrous tissue occupied four or five times the normal area of derma. The tissue was in cross section longitudinal and irregular. Clear areas of

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V IC TO VENETO

N D E X

20 DE CVRANDIS VVL.

Sed nec hippomoclesi vestes eleuatora dicta sub silentio sunt pretereunda quorum officio rostris coruſus vel grunus iunctura adiuuantibus non raro à labore & periculo patientes liberauimus vbi pouſumum magna ſic ofiſ libeſtatio quocumq; formas huc ſubieciunt.



Nunc quomodo horum ſinguli à vſum veniat expromere tempuſtu m eſt. Dux gatur cerebriarum figuræ quarta ſcilicet & tertia ſphæriculam oſis ſecant acophrodun inſtrumentoru & magnitudinu reſponden tem. & vſus præcipuè veniunt in colliſionib; vel ſi ſtutus in quibus oſiſtunt eñ quod auſſerre eſt neceſſium v In fracturis pundum illans vel coruſionibus paru; vel euz quandoque ex ſclopettorum gland

Ex

DE CVRANDIS VVL.

Prætereà non petinde vt in ſimphicibus fra cturis commendantur ligaturæ ſic & in hac conſerre cenſendum eſt. Nam in illis reuini no tantuſm afflicte partis expectatur hic autem petindò extraneoru rerum ablato mox deperduſ regeneratio quæ non niſi temporis diſtornuſcare ſunt. Quibus ſuccedere de her ſeparatarum partium vnio, aut (ſi ma lus) copulatio Pro qua re ſanus erit abſque ligaturis illud immotum, & ſitum, atq; ſe na turalis illius figura expent, ſeruare tantum que illud panis regere ne aeri expoſitum malè habeat. Sed quia quandoque vultus us merab; parte eſt quæ ſuper ſtrato repom tur vt poſterior crucis vel brachij pars ſic vt nos cogat quacumque hora curatio nis ipſum eleuare. Quid igitur minore mo tu minoreque moleſtia id fiat inſtrumen tum tam diuſum ex ærea lamina in quo



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DE CVRANDIS VVL.



Tertius modus eſt, quum ſine cerebelli ſola ſerra de ſcalpro præcipuè cum os amplius eſt, quod tuendū venit auſſerendus ve rum vt dictum eſt, aduocato vel acuto ſcalpro (ſi libeat) ſuſci paradi ſunt, ne hinc atq; illuc ſerra fluat vel pederentia ſecura ma gna ſola ſerra parare vniu portus ac quan tum oporteat ſecare, ad hanc puta formam yel aliam vt pſa oſiſ afflicto monebit.



Serra breuis eſto, ſubtus, denſis, ſique bene acu

THE QUESTION OF GASTRO-ENTEROSTOMY IN DUODENAL ULCERS¹

By GEORGE WOOLSFY MD FACS NEW YORK CITY

FIVE years ago I read a paper on "The Results of Operation in Gastric and Duodenal Ulcers" (20). Since then a great amount has been written on the end results of gastro enterostomy. It has become the custom if not the fashion to condemn the operation. This is not unusual but is what is to be expected as a natural swing of the pendulum so often exemplified in the history of medicine. By this I do not mean to say that many have not had reason to criticize the operation and its results. We can understand this criticism especially when we remember that so much depends upon the proper selection of cases which means the exclusion of all in which an ulcer cannot be demonstrated upon a proper technique and upon careful after treatment.

At the time of my previous paper I found that in 91 per cent of my cases the late results were satisfactory. I have re-examined these cases including only those operated upon 4 or more years ago looking up the more recent follow up reports and inquiring as to the present condition in other patients. I have been unable to get reports from nearly 25 per cent of the patients after they have left the hospital. These have to be eliminated though in my experience most of such patients if we do hear from them have no complaint to bring them back.

I have been able to follow 60 cases from 12 years to 3½ months the average of the follow up reports being 32 months. In 88.33 per cent the result was satisfactory. If we exclude 1 case in which a marked ptosis of the right kidney accounted for the present symptoms the result is satisfactory in 90 per cent. Of the other cases classed as failures 1 patient was well for 6 years and then had a recurrence of ulcer on the posterior surface of the duodenum the original ulcer being on the superior surface. The stoma was found contracted to the size of the finger. Another patient was well for 2 years when symptoms of duodenal ulcer recurred. Another had re-

currence of symptoms after 8½ months. The gastric acidity was normal and he was relieved by medical treatment. Another patient with psychic disturbances was reoperated upon 1 year after the first operation but nothing was found and the stoma was in good condition. In only 1 case was there evidence of jejunal ulcer. This patient operated upon 9 years ago had been well for 15 months or more after operation when symptoms returned. He re-entered Bellevue Hospital a few weeks ago but left before an X-ray examination was made to confirm the clinical diagnosis of jejunal ulcer.

Of the patients classed as improved who at times complain of abdominal symptoms none gives typical ulcer symptoms or symptoms similar to those before operation. About 50 per cent of them suffer from constipation and about 75 per cent have occasional symptoms somewhat suggestive of a gall bladder lesion that is epigastric fullness after eating and pain or distress partly relieved by the belching of gas. I have recently operated on one of these patients 8 years after the first operation. She was well for 2 years and then had symptoms diagnosed as gall stone colic. A chronic gall bladder with gall stones was found and removed. The ulcer was healed though the X-ray showed a deformed cap from scar tissue. The gall bladder was removed only 4 times in this series at the time of the gastro enterostomy and only once for stones. The appendix was removed in 45 per cent of the cases or whenever there was evidence of inflammation. In 5 cases it could not be brought up into the wound for examination, in 7 it appeared normal and in 20 it was not mentioned in the history. If there is any suspicion of chronic inflammation of the appendix or gall bladder removal is indicated.

All other foci of infection should be removed especially infected teeth and tonsils. For years I have been particular about the diet of the patients during their stay in the

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

BY ALFRED J. BROWN M.D. F.A.C.S. OMAHA

THE CURE OF GUNSHOT WOUNDS BY LEONARDO BOTALLIO

WOUNDS have always been more or less infected but owing to the forms of the causative agents in early times the great majority were not particularly severe. In warfare the poisoned arrow was in common use and the results were known but no accurate differentiation had been made between the results due to the poison on the arrow head and the infection from bacteria. When with gunpowder wounds became more severe infection followed and the inference was readily drawn that the infection was the result of poison transmitted to the missile by the powder or that the wounds were burned by the powder. These ideas were put forward by John de Vigo and Alphonso Ferri. No sooner was this theory advanced than opponents to it spring up and a dispute arose which was to be carried on among surgeons for centuries until finally settled by the discovery in the nineteenth century of the causative bacteria. The name of nearly every surgeon of prominence is found in the literature of this dispute even Paré and John Hunter playing their parts and among others is found the name of Leonardo Botallio who published his work

Concerning the Cure of Gunshot Wounds in 1560.¹ Botallio was born at Asti in Piedmont about 1530. He pursued his medical studies at Padua where he received his degree of doctor of medicine and surgery and probably here studied anatomy with the famous Gabriele Falloppio. About this time Botallio's name became inseparably connected with the ductus arteriosus but how or why this connection came about is not established though it was not by the discovery of the duct for its existence was known even in the time of Galen. Being interested in surgery particularly he was called to war and first served as a surgeon in the French Army where he obtained considerable experience in the treatment of wounds. He went to Paris in 1564 and apparently gained the favor of the Royal Family possibly because he was a fellow countryman of the then real ruler of France Catherine de Medici the widow of Henry the Second. Whatever the reason for his success with the Royal Family he served as physician in ordinary to three sons of Catherine King Charles the Ninth Francis Duke of Alençon and King Henry the Third. Following this connection with probably the most famous if

not the most powerful court in Europe Botallio seems to have turned away from surgery and become more interested in medical conditions and particularly in the practice of bleeding. The medical world at this time was divided into two camps. Pierre Brissot (1478-1522) had revived the Hippocratic method of bleeding as opposed to the ideas of Galen and the Arabians who taught that blood should be drawn slowly drop by drop from the side opposite the inflammatory lesion while Hippocrates and his follower Brissot believed that venesection should be free and at the site of inflammation. As was natural the swing of the pendulum carried many to excess and among these was Botallio who taught that blood should be taken frequently and in large quantities even to exsanguination. Though he did not publish his great book on bleeding until 1577 he nevertheless states his position as a believer in the Hippocratic doctrine of derivation in this work on gunshot wounds thus aligning himself with the followers of Brissot.

Though he lets bleeding run away with him he nevertheless holds his head in his treatment of wounds. He does not believe that gunshot wounds are poisoned or burned and in this he says he differs from John de Vigo and Alphonso Ferri. He then goes on to prove to his own satisfaction at least that he is right. His method is interesting. He takes up the ingredients of gunpowder one by one and by applying their humoral qualities to them shows that they can neither poison nor burn. To prove his points on burning he goes back to Aristotle Averroes and Galen. He quotes Dioscorides on the components of powder and shows that they are not poisonous either when applied locally eaten or smelled. He then quotes clinical cases and finally lead on to the conclusion that foreign bodies which cause laceration and decay of tissue are responsible. So he says the proper treatment of wounds consists in the removal of foreign bodies and restoration of parts to as nearly normal condition as is feasible. As foreign bodies he includes pieces of fractured bone contused and lacerated tissue and blood clots. In fractures of the skull he follows Berengerius and as the illustrations show his instruments are quite similar.

Botallio deserves recognition as one of the early sound thinking men to whom surgery is indebted for a step at least in its progress toward independent ideas as contrasted with blind following of the ancient authorities.

¹Courtesy Library of the University of Nebraska. Cf. Page 13 Med. in Omaha, Nebraska.

percentage of jejunal ulcers (17 per cent, von Haberer) However Lewisohn says that the Berg exclusion has not increased the percentage of jejunal ulcers With our most careful efforts it must be admitted that in a small percentage of cases gastrojejunal ulcers do develop but this should not occur in over 2 or at most, 4 per cent

But there are other criticisms bearing on the problem of gastro enterostomy Hemorrhage is not entirely prevented if it has occurred previously Balfour (2) found that in 13 per cent of such cases the ulcers will bleed again if they are not excised He classes bleeding ulcers and small ulcers on the anterior wall as a group suitable for excision Since in 87 per cent of bleeding ulcers no further hemorrhage occurs after gastro-enterostomy we may as Peck (16) says, do a gastro enterostomy as the first step, if excision is not applicable in a given case Hematemesis or melena occurred in 57 per cent after gastro enterostomy in the 1000 cases reviewed by Balfour (3) from the Mayo Clinic but the bleeding subsides on treatment especially if it was not present before operation In many such cases the bleeding comes from the ulcer and not from the stoma As Balfour (3) says serious hemorrhage from the anastomosis must be regarded as a technical blunder for which the surgeon assumes responsibility though Metge (13) reports 4 deaths from hemorrhage after gastro-enterostomy

Although Balfour (3) states that 'protection against subsequent perforation is absolute since not a single case has occurred among these 1000 patients' F M Douglas (5) reports 1 case 3 days after operation

Lewisohn (11) thinks that gastric acidity is not altered by gastro enterostomy In my own cases which show the gastric analysis both before and after operation the acidity was reduced to below normal in 63 per cent and to normal in 27 per cent These analyses were made from 1 month to 8 years after operation Eusterman (7) reports from the Mayo Clinic that the total and free acid was reduced from 40 to 60 per cent after gastro-enterostomy In 283 cases showing the gastric analysis before and after operation

Sherren (19) found 131 with no hydrochloric acid 65 in which it was greatly reduced 52 in which it was reduced to normal and only 37 in which it was not reduced In the first group there was no return of symptoms in the second the end results were satisfactory in the third symptoms persisted in 5 only while in the fourth 17 had symptoms including all who had jejunal ulcer 5 in number

In nearly every case of my series when the postoperative acidity was above normal the result was unsatisfactory This was true of the only case of jejunal ulcer the total acid being 76 and the free hydrochloric acid 61, 14 months after operation

The importance of the reduction of hyperacidity is generally recognized and is well expressed by Balfour (3) who says "The recurrence of ulcer after gastro-enterostomy or in fact after any type of operation is apparently directly associated with failure to reduce the acidity to maintain this reduction and to provide adequate drainage For this purpose the stoma should reach to the lowest point of the greater curvature

The relation between hypo-acidity and freedom from ulcer is not invariable since well developed ulcers exist with achlorhydria Several cases in my series showed a low or normal acidity before operation and one of these was unimproved At least 5 of my cases which were only improved had a low postoperative acidity A high pre operative acidity seems to be a favorable factor Thus of those of this type 86.6 per cent were free of all symptoms after operation and only 6.6 per cent were unimproved

In all these series of cases a large percentage of the patients with duodenal ulcer treated by gastro-enterostomy are entirely well Others forming a smaller group have occasional abdominal symptoms not like those originally complained of which do not interfere with their work or their enjoyment of life In the vast majority of such patients the ulcer has healed and the occasional symptoms of indigestion are functional or due to extra gastric causes No operation can insure a patient against occasional indigestion

These two groups though classed as well or improved, comprise the satisfactory results

REVIEWS OF NEW BOOKS IN GYNECOLOGY AND OBSTETRICS

By GEORGE GILLHORN MD FACS St Louis Mo

WHEN the gynecologist Zweifel¹ and Payr the general surgeon conceived the idea of editing an extensive work on malignant tumors from the standpoint of the clinician they rendered a conspicuous service to the medical profession. The last of the three volumes which has just appeared is devoted to gynecology. It is a stately tome of 636 pages and like its predecessors has been written by a number of men all of whom are outstanding authorities in their respective field. Thus the chapter on malignant growth of the ovaries is contributed by Doederlein that on tumors of the uterus by Paul Zweifel. Kuestner discusses malignancy of the vagina vulva and clitoris Zangemeister the relations of cancer of the bladder and urethra to the genital organs Zweifel Jr describes the malignant tumors of the tubes and round ligaments and Frankl the pathology of chorionepithelioma. The principles of X-ray treatment are presented by Wintz the treatment with radium by Frankl. A chapter on malignancy of the mammary gland in both sexes is by Klein Chas. H. Kessler deals with vaccine therapy of malignant new growths and Joest finally adds a discussion on malignant neoplasms in animals.

The enumeration of the contents gives an idea of the scope of the work but does not convey the admirable manner in which the pathological anatomy is here linked up with the clinical aspect of malignant affections. It has often been deplored by thoughtful medical educators that the study of teaching of pathology as indeed of all so-called fundamental branches is shut off by itself is too much out of touch with the application to the living human subject. This book supplies the connection. Pathology is made as it should be the handmaiden and the boon companion of the diagnostician the surgeon the radiologist. The work thereby becomes equally valuable to the specialist and the general practitioner.

It is true that our treatment of cancer is still very incomplete but does this fact justify the profession in being discouraged. Are there no signs of improvement? Only older physicians so state the editors in the preface who with their own eyes have seen the deplorable condition of cancer patients before the antiseptic era. Can fully appreciate the marvelous advances of today over former times. Then every one with cancer of an inner organ no matter what treatment he received was without exception left to a pitiable often cruelly slow dissolution. Today there are many thousands every year who are cured from cancer of the inner organs

for the rest of their lives and their number is growing steadily.

This optimistic and courageous attitude and the outlook it opens for surgical radiological and vaccine treatments is immensely appealing. In fact I find it difficult to speak of the work without using superlatives constantly. The make up of the book vies with its contents. Paper print and illustrations are excellent and the 44 large colored plates rank I am sure among the best I have ever seen.

THE Spanish translation of Liepmann's *Clinical Lectures on Obstetrics*² brings to mind the attractive features of the German original which were reviewed in these columns a few years ago. Our colleagues in Central and South America will undoubtedly profit by the fact that this work with its thoroughly modern and sound teaching has been made easily accessible to them.

THE same indefatigable author whose books cover a wide range of subjects now presents to us an essay on criminal abortion.³ There is first an estimate of the rapidly growing frequency of abortion which in Germany has at present reached the appalling number of 875 750 per year and its frightful mortality. Then follows an exposition of the causes of danger in criminal abortion a survey of the morbidity and a more detailed description of the various traumatisms and the slim chances of recovery. In the closing chapter entitled "Retrospect and Outlook" the underlying deeper cause of the phenomenon in question are analyzed the shortcomings of our own profession characterized and possible remedies suggested. In short the author paints the evil in all its grossness. And then not satisfied with the impressive word picture he adds an atlas of 24 large plates on which every conceivable sort of injury from the simple instrumental perforation of the uterus to the pulling out and tearing off of intestinal loops is extremely well depicted.

It is a meritorious undertaking that deserves to be known in the widest possible circles. But this is the unfortunate part that the book and the lessons it so convincingly teaches will remain unknown to the very people who are most concerned in this question. For you and I who read the book are fully in accord with the author we know the manifold dangers of criminal abortion and disapprove of it from moral ethical sociological in fact from

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it does not insure against recurrence is evidenced by Finsterlin's (3) report of 6 cases in which ulcer occurred after partial gastrectomy

The achlorhydria produced is not always without bad effects. According to Balfour (3) patients with achlorhydria frequently present a definite syndrome of gastric symptoms which may be more disabling than those for which the gastrectomy was performed

There is however a small but definite group in which partial gastrectomy is indicated. This includes those duodenal ulcers which cause severe hemorrhage in which gastro-enterostomy may fail to relieve the symptoms and pyloroplasty or excision cannot well be applied also those with recurrence of ulcer locally or at the stomi

The recurrence of ulcer in 3.5 to 5 per cent of cases after gastro-enterostomy does not justify gastrectomy in 100 per cent when the mortality of the latter is two or three times as great. I agree with Charles Mayo who in the discussion of Balfour's paper (3) said that he would not allow anyone to remove half of his normal stomach to cure a duodenal ulcer

CONCLUSIONS

Late results. Many series of cases of duodenal ulcer treated by gastro-enterostomy by American and British surgeons give satisfactory results ranging from 80 to 95 per cent. My own series shows 90 per cent. Jejunal ulcer follows gastro-enterostomy in about 2 per cent of cases. In many cases improved (not cured) by the operation the ulcer is healed and the symptoms present are due to extragastric causes commonly the appendix or the gall bladder. Bleeding occurs in only a small percentage (5.7 per cent) after gastro-enterostomy and as a rule this hemorrhage is not serious. Gastric acidity is much reduced

by gastro-enterostomy and remains so. This is essential to the best results

A few simple rules must be followed to obtain good results: (a) A gastro-enterostomy should be done only when the ulcer can be seen or felt. (b) A good sized opening at the lowest point of the stomach should be made. (c) Only absorbable sutures should be used. (d) Extra gastric causes of gastric symptoms and all foci of infection must be removed. (e) The after treatment and diet must be as strict as that used in the medical treatment of ulcer

Excision is applicable in a small group of cases with or without gastro-enterostomy. Pyloroplasty is a good operation but the results are inferior to those of gastro-enterostomy. Gastrectomy has a much higher mortality and is not justifiable as a routine to avoid the small percentage of recurrences. It is applicable in a small group to cure a current hemorrhage or ulceration jejunal duodenal or gastric

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nator and semi supinator bringing the fore arm from the supine or prone position to one in which the radius is uppermost. Therefore the maximum relaxation of the muscle is obtained when the elbow is flexed and the hand midway between supination and pronation the usual position for splinting a fracture of the forearm. As practically all the extensor muscles of the hand and fingers arise from the lower end of the humerus they cause little pull on the fragments but aid in splinting the radius and ulna posteriorly when under tension as when the elbow is flexed.

The supinator muscle arises from the lower end of the humerus laterally and the upper end of the ulna and passes distally and medially to be inserted into the upper third of the radius. Thus a fracture between the upper and middle thirds of the radius would have the upper fragment supinated and the lower fragment pronated by the pronator teres muscle. This muscle arises from the lower end of the humerus medially and the coronoid process of the ulna and is inserted into the middle third of the radius. The action and position of these opposing muscles in pronation and supination is shown in Figure 1.

The more powerful flexor muscles of the forearm have a tendency to produce dorsal bowing of the radius and ulna during healing as their pull is not counteracted by the weaker extensor muscles on the dorsum.

With the essential anatomical facts in mind we can now proceed to a consideration of the points brought out by a study of the 200 cases in which both bones of the forearm were fractured. These have been grouped together in Table I.

In considering the age of the patient at the time of fracture it was noted that the vast majority of fractures of both bones of the forearm occurred before the age of 15 only 24 of the patients in this series being older. It is extremely interesting to note that 110 patients were less than 10 years of age.

In 183 cases the fracture sustained was the result of force applied indirectly that is the injury was usually the result of a fall on the outstretched hand. Bearing this in mind we can

TABLE I—STATISTICAL STUDY OF TWO HUNDRED CASES

Age	Cases
0 to 10 years	110
11 to 15 years	46
Over 15 years	24
Etiology	
Direct violence	17
Indirect violence	183
Site of fracture	
Upper third	16
Middle third	79
Lower third	101
Epiphyseal separation	4
Variety of fracture	
Complete	94
Greenstick	96
Compound	10
Injury	
To bone	200
To soft parts	17
Reduction	
Closed—good	171
Closed—fair	18
Open operation	10
Results	
Satisfactory	194
Unsatisfactory	6

conceive that the natural bowing of the bones to be described may determine in a measure the location of the fracture. The remaining 17 cases were the result of force applied directly such as blows crushing injuries gun shot wounds etc.

The idea seems prevalent that following indirect injury in children epiphyseal separation is to be expected rather than fracture of the lower end of the radius and ulna (Baetjer and Waters 1). Such a point of view finds no support in the present study since in the 200 cases included epiphyseal separation occurred in only 4 instances (approximately 2 per cent). This would seem to indicate that the epiphysis is not the weakest point as is commonly supposed but that as a result of indirect violence such as falling on the outstretched hand fracture is to be expected rather than epiphyseal separation. The explanation of this observation may lie in the following facts: (1) There is little or no strain or leverage exerted on the epiphysis by indirect trauma (2) the epiphysis is protected to a very great degree by the tough capsule of the neighboring joint, (3) the elasticity of the epiphysis,

the secret of success. Frequently under the fluoroscope if traction alone were made on the hand and counter traction maintained on the humerus the fragment slipped into place without manipulation. Eighteen cases were incompletely reduced but the surgeon in charge decided to be content with the reduction obtained without operative interference. That this decision was well justified is indicated by recent examination after complete healing.

Open reduction was resorted to only when the closed method had failed that is in those cases with marked overriding when excess callus from poor reduction would interfere with function or would injure nerve or blood supply, and in adults when there was little or no tendency toward spontaneous correction of deformity. In many instances we have been satisfied to leave the fragments in the position resulting from reduction by the closed method although the reduction was not anatomically perfect. We pursued this course (and this is one of the points we have desired to stress in this study) believing that the ultimate result thus secured would be far more favorable from the point of view of function than the perfect anatomical alignment secured by open reduction. Fixation was secured in 5 cases by the use of silver wire in 3 by plates while in 2 no internal splinting was necessary. In the rather small series of cases in which the open reduction was used subsequent removal of the material used in fixation was necessary for the relief of pain in several instances.

At the time of reduction radiographic examination showed good or excellent alignment in 172 cases in 18 cases the reduction was only fair while in the remaining 10 a sufficiently good position could be obtained only by open operation.

The following observation was made during the course of study which may in a measure explain the correction of deformity which occurs subsequently to incomplete reduction in young persons. It was noted that when bowing occurred callus was laid down on the concave side of the deformity, there being little or no callus on the convex side save when the periosteum was raised from the bone

by the displacement of the fragments. This occurred with a striking degree of regularity in the series studied and is well demonstrated in Figure 4. Here it may readily be seen as for example in the ulna that there is a heavy dense callus extending over a distance of 7.5 centimeters on the concave side whereas on the convex side the new bone formation has less depth and less density and extends only for a distance of about 2 centimeters. The radius likewise demonstrated the same point, strikingly illustrated in Figure 5.

Many explanations have been offered to account for the formation of callus at the site of fracture. Whether new bone arises from the cortex or from the periosteum is still a question of doubt some observers adhering to the former view others holding the latter to be more plausible. It is not our purpose to attempt to determine which of these two views is correct but to put forth what seems a reasonable explanation for the greater amount of callus formation found on the concave side of the bone. This we believe is due to the fact that on the concave side there is a relaxation of the periosteum and soft parts which permits hemorrhage and clot formation whereas on the convex side the periosteum is stretched and more adherent offering greater resistance to hemorrhage beneath the periosteum and into surrounding structures. Granting that hemorrhage takes place as described the various stages concerned in the repair borne out by the experiments of Bancroft (2) are as follows:

Immediately after hemorrhage fibrin formation and contraction of the clot occurs. This is followed by an ingrowth of connective tissue and a rushing in of small blood vessels. Following the penetration of blood vessels two distinct and opposite processes begin the rebuilding with live bone and the absorption of injured bone—the one task assigned by some observers to osteoblasts the other attributed to osteoclasts.

The ultimate result as determined by follow up studies of the group of cases seen during periods of from 1 to 10 years shows that 194 have a good result that is in 194 cases there is no apparent deformity or loss

every possible standpoint. The abortionist of either sex however with or without the prefix of M.D. would not read a book of such a tenor. He would indeed not know of its existence. And those misguided girls and women who in their dense ignorance entrust life and limb to the nefarious manipulations of the abortionist will they be reached by this book and pause to think?

The problem is world wide and the anxiety of the author for the future of his fatherland is not greater than ours should be though we may boast of our country as the land of unlimited possibilities and unlimited resources. A reform must come but it can not come from without. It must come from within that is to say by way of education. Our puritanical hypocrisy that speaks of the red plague when it means syphilis and terms illegal operation what is criminal abortion may for a while stand in the way of progress. But not forever not even for very long. The educational cancer campaign which in this country is directed by the American Society for the Control of Cancer has shown what only 25 years ago would have seemed impossible that one may safely speak to the lay public on subjects which would have appeared indecent to Mid Victorians and the red daughters and granddaughters. The Social Hygiene movement is beginning to call a spade a spade in public meetings and scorns the circumlocution of damaged goods. Very soon let us hope such publicity will be given to criminal abortion then the dark practice will openly be called by its real name and the abortionist exposed to bright daylight and his victims will have to learn the facts and the truth however unwilling they may be. And at that time the book before us with its startling statistics its clear line of thought and its true illustrations will serve as a guiding text to those who will disseminate this much needed knowledge.

EVERY new textbook of obstetrics is of benefit to the profession. As the bulk of obstetrical work is carried on by the general practitioner the averages of instruction in this the most important and the most difficult of all special branches of medicine can not be too numerous. To fulfill its purpose such a textbook should contain only what it is important and necessary for the practitioner to know and this has been the principle which guided Zangemeister in the writing of his work.¹ It may

be stated at the outset that he has succeeded in his task. His descriptions are concise and to the point and yet omit nothing that is essential. In the preface he claims for his book the advantages of homogeneity because he has written it without collaboration with others. The personal equation is therefore quite noticeable throughout the book and enlivens the study. In the chapter on eclampsia face presentation and several other subjects the author's own contributions take their place. Among the pictures many of which are in color there are numerous instructive original illustrations. The chapters on the puerperium and the newborn seem to me particularly attractive. The hints on diagnosis in labor are exceptionally good they will sharpen the student's power of observation and do away with many an unnecessary internal examination. The natal care and the management of the normal puerperium impress me as being discussed a trifle too epigrammatically more space could perhaps be gained for these subjects by curtailing the some what lengthy statistical offerings of which I believe contrary to the author's intent they are not very popular with the average reader.

AN interesting innovation in French obstetrical literature is the systematized bibliography² which Vignes and Dauphin have fashioned somewhat after our own Year Book and similar Reviews in this country and Germany. The more important contributions of the year 1924 are grouped under such headings as ectopic pregnancy abortion physiology and pathology of pregnancy and of labor obstetrical therapy legal and social obstetrics history of obstetrics etc. Preceding this part Vignes presents a number of brief collective reviews of special subjects of particular interest for instance glycosuria in pregnancy causes and nature of toxæmia influence of diseases of the oral cavity on pregnancy in these he does not confine himself strictly to the literary output of only the one year.

A large part of the papers enumerated in this volume is French and in this lies its more specific interest and importance to us to whom French literature is not always easy of access. As the book travels across political frontiers it builds bridges between the workers in obstetrics in various countries makes for better mutual understanding and removes obstacles in the path of progress of medical knowledge.

¹ L. H. A. C. D. Ge. current. E. By Prof. Dr. W. H. Im. Za. a. me. t. Le p. g. 5. Huzel. 6. 7.

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Fig 8



Fig 9



Fig 10



Fig 11

Fig 8 Position of fragments after final reduction (Case 2)

Fig 9 The same arm lateral view (Case 2)

Fig 10 Appearance of radius and ulna 3 years and 10 months after the injury (Case 2)

Fig 11 The same arm lateral view (Case 2)

both in the contour of the arm which is almost without deformity and in the general alignment of the fractured bones. Bony union is gradually taking place. There is considerable callous formation the bulk of which is on the concave side of the bones the jagged protruding ends have been absorbed. The patient uses the arm without hesitancy. All the movements are normal.

He was kept under observation and roentgenograms were made occasionally the final plates represented in Figures 6 and 7 having been taken in March 1923 about 18 months after the injury.

In Figure 6 it is scarcely possible to see the position of the break. There is a slight general bowing of the bones but the marrow cavity has been entirely re-established the cortex is not appreciably thickened the distance between the two bones at the site of the previous fracture is approximately normal. Figure 7 represents the lateral view showing practically the same changes. Examination of the arm at this time shows it to be perfectly straight and functioning well without pain or discomfort.

CASE 2. A U. a male age 13 years fractured the radius and ulna on November 13 1919.

Reduction was done under general anesthesia but good alignment was not obtained as shown in

Figures 8 and 9. There is even considerable overriding of the ulnar fragments as noted in Figure 8 with anterior displacement of the lower end of the ulna as noted in Figure 9. As this patient came within the first group namely those in which the fracture occurred before the completion of bony growth and also as the main deformity was in the lower end of the ulna the surgeon prophesied a good result. The fracture was maintained in anterior and posterior plaster splints for 4 weeks these splints being removed at frequent intervals for massage and passive motion after the tenth day.

When the patient was discharged 6 weeks after the injury the arm was straight and the movements about the wrist joint were well performed and painless. He was asked to return to the hospital August 28 1923 for observation. Figures 10 and 11 represent the roentgenograms taken at that time. Examination showed the arm to be without deformity all the functions well performed and painless.

One is unable to find any evidence of the fracture in Figure 10. The marrow cavity is entirely re-established there is no thickening or irregularity of either the cortex or the periosteum. The overriding of the lower end of the ulna which was noted in Figure 8 seems to have been entirely compensated

ROENTGENOGRAPHIC DIAGNOSIS IN GYNECOLOGY,
PNEUMOPERITONEUM¹

BY IRVING F. STEIN, M.D., F.A.C.S. CHICAGO

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ALTHOUGH it is 13 years since Weber and Lorey independently described the adaptability of the abdominal viscera to roentgenography after pneumoperitoneum and although Orndoff, Stein and Stewart, Alvarez and many others have made valuable contributions to the perfection and scope of the method, the gynecologist is still skeptical as to the value of roentgenography in his work. The reason for this is that the soft genital organs are not generally thought of as being adaptable to roentgenographic diagnosis and therefore little attention has been given this subject. The size and shape of the pelvic viscera and their relationships, their varying densities and organ outlines are the factors of diagnostic importance. These points can be brought out on the roentgen film under certain favorable conditions.

Before taking up a relatively new method of diagnosis, the careful physician might well ask himself the following questions: Can the internal genitalia be clearly and accurately outlined on the roentgen film? Is the roentgen film of any value in addition to the clinical and other laboratory findings? Is the procedure harmful to the patient? Can any gynecological condition be thus recognized that may escape recognition with the usual diagnostic means? Should roentgenography be employed routinely in gynecological diagnosis?

These questions can best be answered by citing cases in point and will be treated in the conclusions.

The gynecologist arrives at a diagnosis usually after careful history taking, a bimanual vaginal and rectal examination and inspection of the vagina and cervix through the speculum. He utilizes smears, cultures and serological tests, the sound and the cystoscope as his judgment dictates. In spite of care and skill, errors in gynecological diagnosis are so common that the physician welcomes any new method of precision which can be safely used to reduce errors to the minimum. The

fact that extra skill and time are required of the physician and that it imposes additional expense upon the patient should not exclude a method which possesses merit. Roentgenographic diagnosis is one of the newer methods of the past 5 or 6 years which enhances accurate diagnosis in gynecology but which is not commonly utilized for this purpose. To Reuben Peterson belongs great credit for clearly demonstrating the practical adaptation of this diagnostic method to gynecology. Working with the late Dr. Van Zwaluwenberg in Ann Arbor, he utilized the partial knee chest posture (Fig. 1) for obtaining accurate optical cross sections of the pelvic organs on the roentgen film and reported a series of 300 cases to the American Gynecological Society in 1921. He also recommended the utilization of Rubin's patency test for transuterine inflation of the abdomen in suitable cases.

Following the Peterson technique I have made use of roentgenography in my gynecological diagnostic work in the past 2 years with so great a degree of satisfaction that I desire to emphasize some of its advantages.

In this field of diagnosis as Peterson brought out, team work is requisite for success. Neither the roentgenologist nor the gynecologist working alone can achieve the results that are obtained by their co-operation. I have utilized carbon dioxide through the Rubin patency test apparatus for inducing abdominal inflation both by transuterine and transabdominal routes. About a litre of gas is usually introduced. This method was used in over 150 consecutive patients with no accidents or untoward results. The only complaint from our patients was the 'shoulder pain' which often distressed them a few days but which could be relieved by assuming the recumbent posture.

We again followed Peterson in the plan of study of our cases, namely, a provisional diagnosis was made after the usual gynecological examination then pneumoperitoneum was



Fig 8



Fig 9



Fig 10



Fig 11

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Fig 9 The same arm lateral view (Case 2)

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badly behaved subjects. Some films were of no value because of radiological technical errors. The technique had to be evolved.

To emphasize the value and usefulness of roentgenography after pneumoperitoneum, the following cases from the above list with illustrations, are reported.

CASE 1 Fig 2 reveals a normal genital status obtained after performance of the patency test in a case of sterility of 12 years. This illustrates that great detail is obtainable by this method of roentgenography. The uterus fundus and isthmus in cross section, ovaries, tubes and round ligaments are clearly seen.

CASE 2 In contrast to the first case, the normal genitalia of a girl of 13 years are depicted in Fig 3 in whom transabdominal pneumoperitoneum was performed to disprove a suspicion of pregnancy. The first menstruation occurred May 1923. After three regular periods she skipped three periods. The family physician thought that she was pregnant and brought her to us for a verification of his diagnosis. The size of the uterine shadow and absence of Peterson's sign of early pregnancy indicated that she was not pregnant. The negative finding in this instance has great diagnostic value aside from the immeasurable mental relief to the parents. Rectal examination would not reveal the condition with the same degree of positiveness.

CASE 3 Fig 4 depicts the pelvis of a patient admitted to the hospital with the clinical diagnosis of fibroids. She complained of metrorrhagia and pelvic pain. Two previous operations had been performed, one for pus tubes and the second for

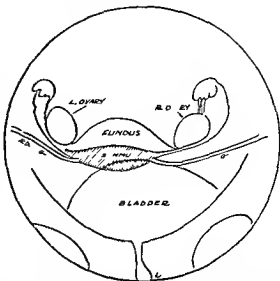


Fig 3 Normal genital status 13 year old girl. Question of pregnancy settled definitely in the negative by the film evidence.

ovarian resection. Palpation revealed a firm mass in the entire pelvis, a tender uterine fundus in Douglas cul-de-sac adherent to the mass. Laparotomy revealed conditions just as depicted in the roentgen film, namely large left and smaller right ovarian cyst, retroverted uterus and adhesions. Total hysterectomy and double oophorectomy were performed.

CASE 4 Fig 5 depicts the findings in another patient in whom transabdominal inflation was per-

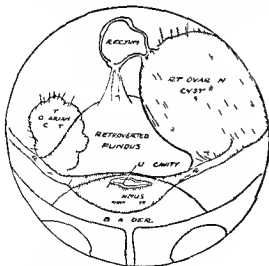


Fig 4 Bilateral ovarian cysts, retroverted uterus, Adhesions.

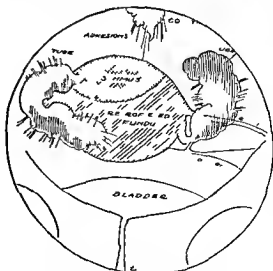


Fig 5 Chronic salpingitis with adhesions, retroflected uterus.

3 In adults there is a very little tendency to overcome deformity following imperfect reduction

4 Following indirect injury or trauma fracture of both bones is to be expected rather than epiphyseal separation

5 When both bones of the forearm are fractured the fracture occurs in the lower two thirds in 90 per cent of the cases

6 Before bony growth is complete a closed reduction is preferable to an open one even

though perfect alignment of the fragments cannot be obtained

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RUPTURED CORNUAL PREGNANCY

DISCUSSION OF CORNUAL PREGNANCY AND THE LITERATURE

By JOHN I GROVE M.D. NEWTON KANSAS

EXTRA-UTERINE or ectopic pregnancy is a condition of rather infrequent occurrence; however during the past decade there has been reported a constantly increasing number of cases of tubal pregnancy as compared with normal gestation. The percentage in 1900 according to different authorities varied from 1 case in 500 to 1 in 1200 pregnancies. The various statistics in recent years seem to indicate that the proportion is perhaps 1 to 250. One writer (8) reports 303 cases in a series of 2688

patients (13 per cent). This increase in percentage might be explained first by our improved methods of diagnosis and secondly by the fact that more cases receive surgical treatment and are thereby more accurately diagnosed. Then too the more common use of hospitals and hospital facilities with the increased number of cases reported in this decade may have some bearing.

De Lee states that extra uterine pregnancy is considerably more frequent in city than in country practice (9). The explanation he



Fig 1. A Fundus of uterus. B Cervix at point of amputation. C Left cornu. D Line of separation of broad ligament. E Cornu elevated above fundus and containing fetus. F The point of the rupture. G The lamina of right tube.



Fig 2. Section through uterine body. A—A Left cornu. B—B Outline of uterine cavity. C—C Cervix. D—D Right cornu. E—E Fetus. F—F Placenta and blood clots. G—G Hypertrophied cornu. I—muscular wall. H—H Fallopian tube.

Transabdominal pneumoperitoneum was induced a litre of carbon dioxide being introduced into the peritoneal cavity and roentgenograms taken of the pelvis. As you perceive from the diagram there is a definitely circumscribed mass in the right half of the pelvis. Below this the cross section of the isthmus and cervix of the uterus can be identified and the gas distended bladder is seen anteriorly. The left half of the pelvis is occupied by a shapeless irregular mass resembling clouds on the film. This is quite characteristic of blood and clot in the peritoneal cavity. The fundus of the uterus is completely obscured by the aforementioned shadows.

On the basis of the roentgen findings laparotomy was performed and a right tubal pregnancy was removed. There was about a pint of blood and clot in the belly.

The statement that the most typical thing about an ectopic pregnancy is that it is atypical is certainly borne out in this case in which uterine bleeding was the only clue to its presence aside from the roentgenographic evidence on the film after pneumoperitoneum.

CONCLUSIONS

1 Roentgenography after gas inflation of the abdomen is of material aid in gynecological diagnosis.

2 It is not a routine measure the usual gynecological examination sufficing ordinarily.

3 In obese uncooperative ignorant or mentally deficient women it may be the only means of accurate diagnosis before operation.

4 Its value lies not alone in positive evidence but also negatively in allaying suspicion of pregnancy or pelvic lesions with few palpatory findings. As a matter of record it has great value.

5 It is a safe method—no accidents occurring in our series of about 150 cases (Peterson's over 300). Two accidents per 1000 are reported in the literature (Coliez).

6 The uterus, ovaries and fallopian tubes, round ligaments, and bladder can be clearly depicted on the X-ray film by a careful technique.

7 Pelvic pathology is graphically shown by silhouetting the viscera on the film after surrounding them with gas. Tumors are readily differentiated.

8 Carbon dioxide is preferred to air or oxygen because of more rapid absorption. All three gases are safe.

9 The transuterine route is preferable when the Rubin test proves the tubes permeable. The latter procedure is of distinct value in sterility both diagnostically and therapeutically.

In our hands the roentgenogram was in some instances the sole means of accurate diagnosis. In others it was the deciding factor in settling differences of opinion. In still another group it portrayed normal pelvic viscera when history and opinion indicated otherwise and proved of great value as a matter of record.

I am greatly indebted to Dr. R. A. Arens, roentgenologist at Michael Reese Hospital for his patience, interest and support under whose directions all of our films were taken.

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Fig 5 Section through embryo showing decidual cells and embryonic tissue



Fig 6 Section through the placental and embryonic tissues

cavity and the tube could be easily traced. Katz gives some interesting statistics taken from postmortem records extending over the period from 1899 to 1922 in which there was a series of 32 deaths caused by ruptured ectopic pregnancies. Of these 23 were isthmal, 5 ampullar and 4 interstitial or cornual. From the above it is clearly evident that the condition of cornual pregnancy is of rather infrequent occurrence.

DIFFERENTIAL DIAGNOSIS

Cornual pregnancy may never be differentiated preoperatively from isthmal and ampullar but the continued closer scrutiny of the histories and the more accurate interpretation of our physical findings may at least give us the occasional reward of a par diagnosis.

The asymmetry of the fundus known as the Ruge Simmons sign, in our case was only distinguishable after the abdomen was open but on preoperative bimanual examination it gave one the impression of a fixed tubal mass close to the uterine horn, solid enough to suggest a fibroid. This will be suggestive if encountered again with the syndrome of tubal pregnancy. The absence of any fixed mass in the opposite adnexa and the lack of cul de sac masses were noted in our cited case. While these did not preclude the diagnosis of ordinary pus tubes they should also have been suggestive.

The findings on bimanual examination of

an enlarged fundus with an asymmetrical mass making its displacement forward and not toward the cul de sac should always suggest a cornual ectopic condition.

CASE HISTORY

Our patient is 28 years of age, has been married 8 years and has a child 7 years of age. Her entry to the Axtell Hospital was on March 23, 1924.

History. Patient's parents were both living and in good health, two brothers and one sister living and well, no brothers or sisters dead. Her past history showed that the patient was operated upon for acute appendicitis 6 years previously. There was no history of any miscarriages. The patient believed she had had some pelvic infection probably gonorrheal, originating about 2 years before and persisting in subacute form up to the present time. This infection had been so severe at times that the patient had gone to bed with fever and pelvic pains. Her menstrual history up to 2 years ago was normal, not painful and fairly regular. For the past 2 years the periods had been more painful and inclined to more irregularity. The January period was normal and on time. The February period was passed and patient consulted a physician for this condition and I presume received the usual placebo. She stated that early in March she flowed a few days, then the period stopped and again after a few days she had a considerable amount of discharge with only slight bloody show. This discharge had entirely ceased on the day prior to her entry to the hospital, which was the first day she experienced acute symptoms. On Monday, the day prior to her hospital entry at 11:00 a.m. while going about her ordinary household duties she fell over in an unconscious spell which lasted several hours. This spell was attended with very severe pain over the abdomen and all evidence of shock and hemorrhage. She was seen by her local physician who recognized the condition

edema were interspersed between layers of fibrous tissue. Nuclei were sparse compared to the number of fibers. Numerous small capillaries were seen with normal walls. The lumen of the capillaries were dilated but empty of cellular content. Branching of some of the capillary vessels was seen.

The hair follicle and sebaceous glands present were broadened and somewhat lengthened.

Several islands of epidermic cells about a third way down in the derma were present. No connection with the epidermis was found.

The papillary bodies were insignificant. Along most of the section the papillary bodies were irregular.

The line between the derma and epidermis was demarcated by a line of hyperemic vacuolated cells of the pigmented basal layer.

The epidermis was thinned. The prolongations down of the pegs were irregular, sometimes branched but never conglomerate. The surface was in distinct folds. The horny layer was adherent within the folds and filled the pits. Over the hair follicle the surface was indented and filled with a veritable keratotic plug. The summits of the folds were practically free of horny layer cells. The keratinization was normal.

The Malpighian layer was much thinned, varying from five to ten cells thick. The cells were rather closely packed without much separation of the prickles. There was a clear space about some of the nuclei.

The cells of the basal layer were swollen. The cell protoplasm was almost ballooned with fluid and the nuclei sometimes were to one side and sometimes in the middle. The pigment granules were restricted to the basal layer cells but the pigmentation was distinctly increased.

What little subderma there was present in the section showed dilated vessels of normal thickness. The sweat glands were of normal appearance.

The Weigert elastic tissue stained sections showed the elastic fibers directly beneath the basal cells layer to be practically continuous. The fibers were thicker than normal, curled and branched. Other elastic tissue fibers seemed crumbled. In the derma proper the



Fig. 1. Photograph showing leion in author's patient.

amount of elastic tissue fibers present seemed small. The circumvascular elastic fibers were normal in thickness. In the neighborhood of the hair follicle and sebaceous glands the elastic fibers were more numerous.

CASE REPORT. Miss F. T., an American born school girl 15 years of age first presented herself to the clinic of the New York Skin and Cancer Hospital August 23, 1924. Her family history was negative except that a sister had had an erythematous eruption probably toxic in nature which disappeared spontaneously. Her past history had no bearing on the condition presented. As far back as the patient or her parents remembered, probably from early infancy a small spot had been noticed in the center of the back of the neck just below the hair margin. This lesion had gradually increased in size slowly at first apparently more rapidly within the past year. She now presented a raised slightly pendulous area of skin on the nape of the neck measuring $\frac{3}{4} \times \frac{1}{4}$ inches, the long axis of which was parallel to the long axis of the vertebral column. The follicular openings in this area were enlarged but the hair was fine and sparse. The skin was lax, the natural folds and rugae enlarged giving rise to an uneven surface which was slightly more pigmented than the surrounding integument. The skin could not be drawn out farther than its redundancy permitted. The patient had no other skin abnormalities.

The patient's general health was good. The neurological examination revealed nothing abnormal and the patient had kept up with her classes at school. She was apparently of average mentality.

The lesion was removed under local anesthesia by Dr. William Asbury Smith (now of Beaumont, Texas) and the wound healed resulting in a linear scar.

THE SURGICAL TREATMENT OF GASTRIC AND DUODENAL ULCER¹

BY JOHN DOUGLAS M.D. I.A.C.S. NEW YORK CITY

CONSIDERATION of the surgical treatment of gastric and duodenal ulcer presents two problems. First, which cases shall be treated surgically? Second, if operation is determined to be advisable, what surgical procedure shall be carried out? Each of these questions is still a matter of disagreement or rather argument the former between the internist and the surgeon, while the latter concerning the relative value of different operations is as yet far from being agreed on among surgeons. In fact, during the past year in three papers read before the New York Surgical Society three different surgical procedures were considered. Possibly the difference in specific conditions encountered prevents any standardization which might simplify the problem.

One reason for the lack of unanimity of opinion as to the first question is the fact that each surgeon bases his opinion on his own limited number of cases. Of a number of patients treated by operation a certain percentage for various reasons have recurrence of symptoms. Such patients consult the internist who sees a few of these patients but does not see those who have been cured and of course is impressed by the number of uncured surgical cases and therefore argues against surgery. On the other hand the surgeon rarely sees patients who have not been treated for varying periods more or less adequately by the internist. W. J. Mayo has said that his idea of the time to operate on a gastric or duodenal ulcer is after it has been cured nine times by medical treatment. Scudder states that in a series of cases operated on at the Massachusetts General Hospital for gastric ulcer the average term of medical treatment was between 5 and 10 years. Finney and Friedenwald give the average time of medical treatment before operation as 9 years.

Some of the elements which make it most difficult accurately to determine the end results of medical treatment and the value of

opinion based thereon are: The difficulty of certain methods of diagnosis, the characteristic periodicity of symptoms which often disappear spontaneously or under treatment only to recur and the recurrence of symptoms or even perforation after patients have been discharged as cured. Many examples of these conditions are easy to cite. After the most careful history, clinical study and X-ray examination on which a diagnosis of ulcer is based, an operation may fail to demonstrate the lesion. Such a case if no operation is performed would be classed as a cure or a failure to cure of a gastric or duodenal ulcer. On the other hand, after the diagnosis of ulcer is made at operation a diseased gall bladder or I believe less frequently, thin is generally stated, the appendix may be found to be the cause of reflex stomach symptoms.

The natural inclination is to remember individual cases that are so striking as to remain in the memory while the usual group makes less impression. I acknowledge that I may be unduly impressed by such cases as the following. A patient with duodenal ulcer was discharged from the hospital as cured after medical treatment and the ulcer perforated a few days later. Another patient after careful roentgenographic examination and medical treatment was referred to the surgical division for operation for ulcer. No ulcer was found, the lesion present being a cholecystitis. One patient entering the third Surgical division at Bellevue Hospital had undergone careful treatment for 8 weeks with the Lenharz diet in a hospital in another city and he brought a careful copy of the note of his treatment. He was discharged cured. Four weeks later he was operated on in Bellevue Hospital and a large unhealed active ulcer found.

As an argument against operation the internist cites cases in which the patient still complains of symptoms or of marginal ulcer as a post-operative complication. This latter does occur in a certain percentage of cases

hospital and for some months thereafter. By observing these precautions I think that the number of patients classed as well will increase at the expense of those classed as improved. On the whole I think that our results are satisfactory, though the percentage is a very little lower than it was 5 years ago.

When we examine the literature we find a number of surgeons especially German surgeons and those most influenced by German surgical literature who, with a rather high mortality and indifferent results have abandoned gastro enterostomy and substituted gastrectomy entailing a higher mortality to obtain better results.

It is difficult to explain the poor results obtained by many surgeons. There are a few simple principles that must be observed if good results are to be obtained from gastro enterostomy for duodenal ulcers.

1. It should never be done unless the ulcer can be seen or felt.

2. A few essentials in the technique are (a) The opening is made so that it lies at the most dependent part of the stomach (b) only absorbable sutures are used (c) the proximal loop of jejunum is made short but not taut (d) all foci of infection intra abdominal and extra abdominal must be removed and careful diet instituted. With these simple rules the mortality should be low and the poor results and sequelæ few. Of the sequelæ jejunal or marginal ulcers have caused the most criticism of gastro enterostomy. Balfour (1) states that in 2 per cent of the large number of gastro enterostomies at the Mayo Clinic jejunal ulcer developed. Koennecke and Junge (10) report jejunal ulcer in 4 per cent of 520 cases. Lewisohn (11) states that it is generally assumed that jejunal ulcer follows in 5 per cent of cases. As Balfour (1) says the symptoms of jejunal ulcer are easily recognized and the diagnosis is confirmed by the X ray in more than 95 per cent of cases. The pain is usually lower often to the left and as Lewisohn says it is more intense. A few jejunal ulcers occur later than the 2 year limit given by Sherren (19). Koennecke and Junge (10) in 22 cases found only 3 ulcers developing from 3 to 9 years later. The real cause is

unknown and they still occur when the contributing causes that we know are eliminated. In my small series it has occurred in less than 2 per cent of the cases we have been able to follow.

The discrepancy between 2 and 4 per cent, from actual series of cases referred to above is not so great but that it may be explained by differences in technique and other factors. But in a recent paper by Lewisohn (11), he says that in 68 cases traced 4 to 9 years after gastro enterostomy for duodenal and pyloric ulcers, jejunal ulcer was proved by operation in 18 per cent and diagnosed by the X ray together with clinical symptoms in 16 per cent a total of 34 per cent. These figures are to me inexplicable and so at variance with the general experience that it seems as if there must be some peculiar factors to account for them. Some may be explained by failure to follow the few simple rules I have laid down for gastro enterostomy, but that alone is hardly sufficient. Eusterman (6) finds that there is a tendency to recurrence of ulceration in the Hebræw, and in those with a highly irritable nervous system who smoke excessively. The intemperate use of tobacco alcohol and condiments hasty eating of bulky indigestible food soon after operation also fatigue, exposure and infection are predisposing causes. These factors may in part explain Lewisohn's experience as his report is from the Mt Sinai Hospital. Apparently Pagenstecher thread was used for the outer peritoneomuscular suture in most of Lewisohn's cases.

As Renton (17) has shown in 3 cases and in animal experiments the outer suture if unabsorbable, tends to work its way into the lumen and be cast off even when it has not penetrated the mucosa. In this process it is obviously a source of infection. This has been demonstrated by many other observers. In a study of jejunal ulcer Guillaume and Hara lamibidis (9) in discussing preventive measures emphasize avoiding local irritation especially from sutures and hyperacidity and particularly keeping up medical treatment after operation.

The von Eiselsberg exclusion method has been given up as it is followed by a high

mortality was under 2 per cent in all cases. More recently Balfour reporting on 1000 cases, all operated on 10 or more years ago states that 88 per cent were cured and that there were only 3.5 per cent of recurrences. Finney gives end results of gastro enterostomy as 77.2 per cent of cures with 88.6 per cent of complete cures by means of pyloroplasty. Pool reports 50 patients well out of 59 cases followed up after gastro enterostomy, 84 per cent. Deaver gives 80 per cent entirely well and 10 per cent markedly benefited but having occasional digestive upsets due to indiscretions of diet. Scudder's analysis of 108 cases of chronic gastric ulcer showed 99.917 per cent well of 94 cases of duodenal ulcer 88 well 93.6 per cent. The most recent English statistics quite closely correspond to American. Moyrhan reports cures in 90 per cent of his cases. Sherren reporting on 500 cases states that 92.6 per cent were well 2 or more years after operation. Walton in 114 cases reports 85 per cent cured and 10 per cent improved.

Examination of the cases of gastric ulcer operated on by the various members of the Surgical Staff of St. Luke's Hospital New York from June 1, 1918 to October 1, 1924 the period during which the follow up has been in operation showed a total of 68 cases operated on by gastro enterostomy with excision or cauterization of the ulcer or both. The operative mortality was 7.5 per cent 5 cases or if 1 case operated on for perforation be excluded 5.8 per cent. One patient died 2 years after operation from carcinoma. Eleven cases could not be traced. There were therefore 5 cases followed. Of these 48.923 per cent were reported cured 3.53 per cent improved and 1.24 per cent failure. The causes of death exclusive of the case of perforation were in 2 cases pneumonia in 1 uræmia and in 1 profound anæmia. In addition to the 68 cases treated by gastro enterostomy there were 14 cases of gastric ulcer treated by pyloric or midgastric resection with 1 death (6.7 per cent) 1 case we lost track of and the 14 remaining patients were cured or made no complaints.

The records of 144 cases of duodenal ulcer operated on during the same period at

St. Luke's Hospital showed 15 deaths 10.2 per cent but of these 13 deaths 5 followed operation for perforated ulcer 1 died from pernicious anæmia and 2 were associated with fissions of the biliary tract 1 of which showed cholelithiasis and cholecystitis the other common duct obstruction. If these be excluded the mortality was 5.8 per cent. Of the 100 cases followed 90 per cent are reported cured. Five were improved but had some symptoms after indiscretions in diet. Five patients 5 per cent were unimproved.

However, there are a number of surgeons particularly those in Europe who for several years have been dissatisfied with the results of excision and gastro enterostomy and have reported very different results from their operations.

Finsterer of Vienna during a visit to this country in the fall of 1923 quoted the following statistics. Payr had in his material 62 per cent recoveries and 38 per cent failures. Bier 66 per cent and Haberer 37 per cent recoveries.

Many reports from the French clinics also show unsatisfactory results. The series of statistics giving the worst results after gastro enterostomy for the treatment of duodenal ulcer published by an American surgeon are those of Lewisohn in *SURGERY, GYNECOLOGY AND OBSTETRICS* January 1925. He reports that examination of 68 cases 4 to 9 years after operation showed 47 per cent completely cured and 19 per cent with a fair result. Thirty four per cent of the patients had gastrojejunal ulcers. In 12.18 per cent a second operation was performed. In 11.16 per cent the diagnosis was based on clinical symptoms and X ray findings. The mortality in 213 cases of all kinds of stomach operation for the period from 1915 to 1920 was 22.10 per cent plus.

This latter group of statistics is the basis for the advocacy of the more radical operations such as subtotal gastrectomy and the many other types of operation which have been suggested during the past few years and which will be considered when the choice of operation is discussed.

It is generally conceded that acute perforation marked stenosis, and most of those

and represent from 80 to 95 per cent of the cases. Balfour (3) in 1000 cases operated on at the Mayo Clinic 10 or more years before found satisfactory results in 88 per cent. W. J. Mayo (12) says that gastro-enterostomy cures over 90 per cent of duodenal ulcers and Peck (16) in a recent article, states that 80 to 90 per cent of the patients were completely relieved of symptoms. Sherren (3) in 500 cases reports 92.6 per cent perfectly well, 2 or more years after gastro-enterostomy. Not all continental surgeons report unsatisfactory results. Galpern (8) says that in duodenal ulcer gastro-enterostomy gave 78.2 per cent of excellent results and 19 per cent of bad results. Schwyzer (18) found that gastro-enterostomy gave relief in 80 per cent for 4 years. Later the number was reduced to 75 per cent.

The small percentage of unfavorable results include the few jejunal ulcers and recurrent ulcers in the duodenum or stomach. Such recurrent ulcers, whether jejunal, duodenal or gastric form a small group suitable for gastrectomy.

Most of the failures in Balfour's (3) series were in the 129 cases in which the appendix was not removed. Eusterman (7) says that in from 13 to 18 per cent of all cases of chronic ulcer there is associated gross disease of the gall bladder. I agree with Blackford and Dwyer (4) that if the careful internist says that the gall bladder should be removed on the clinical and physical evidence, the surgeon must seriously consider his responsibility in saying that the gall bladder appears normal and in leaving it alone. The difficulty lies in diagnosing from symptoms alone a slightly diseased gall bladder without stones when the picture is obscured by the symptoms of ulcer.

But there will still be a very few patients in every hundred operated upon who complain of vague symptoms often functional in origin, frequently associated with constipation, who sometimes are neurotic or mentally disturbed whose treatment should be medical and dietary and not surgical.

What are the alternatives to gastro-enterostomy for duodenal ulcer? The three following will be briefly considered.

1 *Medical treatment* The majority of patients that come to the surgeon have had one or more courses of medical treatment with relapse. Nielson (15) re-examined 239 patients after they had been treated medically 2½ to 19 years. In 95 to 98 per cent of the cases the patients were discharged symptom free but 200/83.7 per cent were not permanently cured. The longer the duration of the ulcer the larger the percentage of recurrences. If we take into account the results of hemorrhage and perforation medical treatment has a higher mortality than surgical treatment. As Moynihan (14) says in his Hunterian lecture, The mortality of gastro-enterostomy is about 2 per cent. Moynihan had 500 consecutive cases without a death.

2 *Excision or pyloroplasty* Excision is applicable to some bleeding ulcers and to recent, single small ulcers on the anterior wall of the duodenum, without scar formation or stenosis but this includes only a small group. Ulcers giving repeated hemorrhage are better treated by excision if this is technically applicable. In suitable cases it gives satisfactory results and may be combined with pyloroplasty or gastro-enterostomy. Balfour (3) states that even in small recent ulcers experience in the Mayo Clinic shows that excision with or without pyloroplasty gives no better end results than gastro-enterostomy.

Pyloroplasty affords the opportunity to excise the ulcer in a moderate percentage of cases. It does not prevent the reformation of ulcers. Thus Horsley (3) observed recurrence along the suture line in nearly 10 per cent of cases. Eusterman (7) states that experience with several hundred pyloroplasties has not been encouraging and that at least 15 per cent of pyloroplasties are later subjected to gastro-enterostomy with good results. An advantage of gastro-enterostomy lies in the fact that it is non-destructive and can be undone.

3 *Gastrectomy* This is a more serious operation and gives a mortality at least two and a half times as great as gastro-enterostomy that is 5 per cent (von Haberer) against 2 per cent or less. Lewisohn (11) gives the mortality as 5 to 10 per cent. That

such conditions it is reasonable to expect intestinal indigestion. Much has been written of the liability of the gastroenterostomy stoma to close particularly if the pylorus remains patent. In none of those gastroenterostomies done at St. Luke's Hospital has the stoma been known to have failed to remain patent. However in the case of a patient who had been operated on 5 years previously in another city I found the stoma closed although the pylorus was also tightly occluded. However it must be a very rare occurrence. It is my belief that by far a more common source of postoperative trouble is that too large a stoma allows too rapid emptying of the stomach contents. A series of 14 cases checked up at varying times after operation in the X-ray department of St. Luke's Hospital by Dr. LeWald or 3 years ago would seem to verify this opinion.

A very interesting suggestion as to the failure of gastroenterostomy to cure ulcer or to function properly is that advanced by Devine before the meeting of the American College of Surgeons in 1924 and published in *SURGERY, GYNECOLOGY AND OBSTETRICS* in January, 1925. He postulates that the cure of the ulcer and relief of symptoms depends on the proper neutralization of the hyperacidity by regurgitation of the alkaline intestinal juices and states that two mechanical causes may prevent this. Either a spur formation occurs at the gastroenterostomy stoma which directs all the flow into the stomach or an axial twist of the intestine at the point of anastomosis prevents a sufficient regurgitation or proper drainage.

It has been generally stated in the American literature that gastrojejunal or jejunal ulcer followed gastroenterostomy in 1 to 3 per cent of cases. In the German literature this was estimated to occur in from 5 to 10 per cent of cases and now Lewisohn has reported as previously stated 34 per cent. This number of gastrojejunal ulcers and the reported poor results from the foreign clinics caused the advocacy of more radical treatment of duodenal ulcer. Haberer was one of the first to use extensively the method of pyloric resection for duodenal ulcer performing the anastomosis, a gastroduodenostomy by the

modification of the Billroth I method. This procedure was adopted by many European surgeons. Finsterer however, stated that this was followed by many recurrences and in his lectures 18 months ago said that already 29 recurrences of ulcer had been observed. He therefore advocated and practiced a resection of two-thirds to three-fourths of the stomach for duodenal ulcer with an anastomosis by the Polya method.

When the ulceration of the duodenum is situated so near the papilla of Vater or is so extensive that removal of the duodenum is impractical, he divides the stomach proximal to the pyloric muscle, resects the antral portion of the stomach and anastomoses the remaining portion to the jejunum.

Many other methods have been suggested of avoiding gastroenterostomy. The Finney method of pyloroplasty has stood the test of many years but cannot be done if the duodenum cannot be mobilized. C. H. Mayo has recently suggested a modification of the Finney method. Erdmann has recently reported on 50 cases of pyloroplasty done by the Horsley method with 90 per cent of cures. It is of interest to note that Erdmann reports an increasing number of cholecystectomies in the last of this series of cases.

It is extremely difficult to reconcile the statistics of those advocating the very radical operations for duodenal ulcer because of the frequency of gastrojejunal ulcer and other bad results with those still adhering to the less radical measures. I feel that I am expressing the opinion of all of the surgical staff at St. Luke's hospital where this class of patients have been carefully followed during the last 5½ years in the figures here given which are a fair expression of the belief that these results are too favorable to justify the radical operation of subtotal gastrectomy for duodenal ulcer. These radical operations are based on the theory that only by removing the hyperacidity can ulcer be cured and that while the acid forming glands are in the fundus of the stomach resection of the pyloric two thirds removes the hormone which stimulates these glands to action. Finsterer states that hyperacidity is greater in duodenal than in gastric ulcer cases.

FRACTURE OF BOTH BONES OF THE FOREARM

STUDY OF TWO HUNDRED CASES

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THE trend of practice at the present time is to reduce fractures by open operation only when it is impossible to obtain fairly satisfactory position by the closed method. There are cases however in which lack of ro operation on the part of the patient or absence of operating facilities cause the surgeon to be content with a partial reduction. It was this type of case that prompted a review of 200 fractures of both bones of the forearm treated in this clinic. The results of the study show that greater liberties can be taken if the fracture occurs before the bone growth has been completed as will be seen in the cases reported.

There is much discussion in the literature concerning the open and closed methods of treating fractures. At a meeting in Glasgow in 1922 Young (5) remarked "We want very much to get away from the attitude of being readily satisfied with anything short of the best attainable." Apparently indicating operation as the only method by which such a standard can be maintained he stated that

it is the failure to adopt even yet in some surgical clinics the open operative method as almost a routine procedure that must bear the larger part of the reproach that still remains in the sphere of fracture treatment. As opposed to this idea Dowden (3) of Edinburgh stated that he had obtained good results by reducing the fractures as well as possible without operation, that the perfect anatomical adjustment of the fragments was not necessary but that early active and passive motion of the extremity involved was very important. In some cases he did not even splint the fracture but placed it in a sling. He emphasized this method of treatment by saying active movements should follow on the heels of pain. The above points of view diametrically opposed as they are indicate the lack of uniformity in our methods of handling these fractures. One surgeon is

content only with a perfect anatomical and functional result, while a second places function first and deformity as a secondary consideration. It is the purpose of this study to determine which of these two conflicting viewpoints is the sounder. It may well be that neither is entirely correct, nor on the other hand entirely wrong and there is possibly a middle ground that may be followed to the best advantage.

A brief review of the anatomy of the forearm is essential to a clear understanding of the fractures which occur in this region since the position assumed by the fragments is constant at the different levels depending upon the particular structures involved at the site of injury.

The shafts of the radius and ulna first appear in the second month of fetal life. The olecranon appears in the tenth year and fuses with the shaft in the sixteenth year. The lower epiphysis is first found (by X ray) in the sixth year and fuses in the twentieth. The ulna forms the articulation of the forearm with the humerus its lower end playing an almost negligible part in movements at the wrist. Just the reverse condition holds true for the radius in that its lower end plays the leading role in the movements of the wrist whereas, its upper end serves only in a minor capacity at the elbow joint. In supination the bones of the forearm lie parallel whereas in pronation the radius is rotated about the ulna and crosses it at about its middle third.

If the origin, insertion and action of the muscles of the forearm are considered in the reduction and fixation of these fractures the task is frequently simplified and a better result obtained. This phase of the anatomy of the forearm is important (Fig. 1).

The brachioradialis muscle arises from the lower end of the humerus and is inserted into the lower end of the radius. It assists in flexing the forearm and is also a semi pro-

procedure and the follow up shows all these cases relieved of symptoms. In 1 patient with the lesser curvature and posterior stomach wall so adherent or indurated that posterior gastro-enterostomy could not be done an anterior gastro-enterostomy with an entero-enterostomy has caused complete relief of symptoms more than 2 years later. Rarely one meets with a stomach lesion in which the pathological condition is such that resection on account of extreme ulceration and adhesions presents insurmountable difficulties without greatly endangering the life of the patient and even a gastro-enterostomy seems impractical. In such cases a jejunostomy may give the ulcer time to heal and either allow a cure or a second operation when necessary. Moynihan has advocated this method of treatment either alone or with an anterior gastro-enterostomy, and in 1 case from the St. Luke's series in which the jejunostomy was left open for a year a large increase in weight with a marked improvement of the stomach lesion has resulted, and now 2 years later the patient is symptom free.

In the treatment of acute perforation it is now generally conceded by most surgeons that closure of the perforation with or without excision of the ulcer and without an accompanying gastro-enterostomy is the operation of choice. If the perforated ulcer is at or near the pyloric ring an excision followed by a pyloroplasty after the method of Horsley has given excellent results.

We will probably never cure 100 per cent of our ulcer patients either by medicine or surgery unless we can know all the factors which enter into the etiology and remove all the causes of ulcer. In one of my cases I excised an ulcer of the lesser curvature but did not do a gastro-enterostomy. Symptoms recurred after 2 years and at a second operation a duodenal ulcer was found. A gastro-enterostomy was done and the patient has been well since over a period of 6 years. Patients who develop gastroduodenal marginal or jejunal ulcers after gastro-enterostomy are apt to develop ulcer again after a second or even third or fourth operation. Resection of the stomach after the Polya method seems to be indicated in these cases.

Many years ago Rodman advocated pylorotomy for chronic ulcer to remove the ulcer bearing area but Cole and Hoguet have reported a large marginal ulcer after a Polya operation and Lewisohn 3 cases following Billroth II operations while the 29 cases reported by Finsterer after the Haberer operation have been mentioned already. Of course the advocates of the radical operation for duodenal ulcer are equally radical in the case of gastric ulcer, and it would seem to me with better reason. But that three fourths or more of the stomach should be removed for a small ulcer of the lesser curvature or anterior wall of the stomach or for a duodenal ulcer still appears to me a question to await final decision for the reason I mentioned in discussing the treatment of duodenal ulcer.

Therefore to attain the best possible results it is necessary in addition to the best operative procedure to carry out as careful after treatment as to diet and so forth as the patients themselves will allow. Treatment should also be given before at the time of operation and afterward in an effort to remove or prevent those foci of infections which are most probably factors in the etiology of the patient's lesion. It has been my observation that most of the patients who have unsatisfactory results after operation complain of persistent constipation.

It has been stated that about 50 per cent of the mortality following gastric operations is due to chest complications and therefore our mortality will be lessened materially by careful pre-operative treatment, the avoidance of operation in the presence of a beginning cold or coryza or sore throat, cleaning up a dirty mouth, teeth or tonsils before operation and the use of a local anæsthetic in bad risks.

SUMMARY

I. Choice between medical and surgical treatment

1. If the case is acute or in the presence of acute hæmorrhage medical treatment should be tried first and given every opportunity to cure the patient.

2. Operative procedure should be employed after medical treatment has failed when there are repeated hæmorrhages when

with its cartilaginous attachment is much greater than that of the diaphysis

The radius and ulna were divided into thirds and it was found that 101 fractures occurred in the lower third 79 in the middle and 16 in the upper third. The reason for this distribution is not immediately apparent. Is it because these bones are sturdier in the proximal third than in the distal two thirds or is it perhaps because the upper portion of the bones is better protected by the muscles of the forearm? One or both of these reasons may be applicable. It is certainly true that the proximal portion of these bones is thicker and larger since at this site the muscles of the forearm have their origin and the muscles of the upper arm their insertion. In addition to the above mentioned factors which may aid in the prevention of fractures in the upper portion there is a natural bowing which may account for the predominance of fractures in their distal portion.

Within the brief scope of this paper it was not deemed essential to enter into any detailed classification, hence the series was divided simply into complete incomplete or greenstick and compound fractures. Ninety-four of our cases were of the first variety, 96 of the second and 10 of the last. It is usually stated that in children the predominant type of fracture is the greenstick variety. To explain this idea it has been held that the bones of children are soft and hence more elastic and for this reason are more liable to bend than break. Such would seem to be logical reasoning though it is interesting to note that in this series incomplete fractures occurred almost as frequently in children as complete ones there being 96 of the former and 80 of the latter.

In simple fractures the soft parts were rarely injured seriously. Occasionally however a small hematoma developed over the site of fracture but in every case was promptly absorbed. Nerve injury was never present in the simple cases. In those cases resulting from direct violence all varieties and degrees of injury to the soft parts were found making amputation necessary in a few instances.

In fractures of the forearm as elsewhere the necessity for prompt reduction is obvious

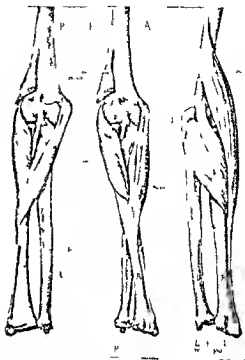


FIG. 1 Illustrating that particular part of the anatomy of the forearm most frequently fractured

Gould (4) says Reduction of the fragments should be complete or perfect at once we should not rest in any half way house content with an improvement today with the hopes of still greater correction tomorrow. In all reductions of the forearm three aims should be kept in mind (1) as rapid firm bony union as possible (2) as complete anatomical correction of fragments as possible (3) as early active and passive motion as possible. It is not always advisable to subject the patient to repeated reductions in order to obtain a perfect position of the fragments because an extremity which has been immobilized for a great length of time or which has been subjected to repeated manipulations is likely to have impaired function for a considerable length of time afterward. One might infer from this that good function is better than a condition which the X ray plate shows as anatomically perfect.

Whenever possible a closed reduction was done there being 190 cases in this series, the other 10 being treated by open operation. In dealing with fractures traction seems to be

RESECTION OF LONG BONES FOR CHRONIC OSTIOMYELITIS

By GEORGE I. BAUMAN, M.D. AND HORACE E. CAMPBELL, M.D. CLEVELAND, OHIO

THE management of osteomyelitis is probably one of the most discouraging aspects of the practice of surgery. The disease so resists treatment that the unfortunate subjects undergo large numbers of operations without eventual cure and often carry discharging sinuses throughout a long period of their lives. Resection of the diseased bone has been advocated by several, but apparently has not been generally accepted.

In 1920, in the course of performing a sequestrectomy for chronic osteomyelitis we did an actual resection of the shaft. While the healing and regeneration were not good in this case (Case 1) it presented the possibilities of the method and further resections for chronic osteomyelitis have been performed. We have resected portions of the long bones in 23 patients with a total of 28 resections. The results have encouraged us in the belief that this method may be a cure for chronic osteomyelitis in children at least.

Since the monumental work of Ollier in 1867 it has been known that the periosteum is capable of completely regenerating a new diaphysis. His results were not of the best because he did not distinguish between tuberculous and infectious lesions and because antiseptics had not been developed. Cheever (3) in 1870 was the first in this country to report operations in accordance with the principles laid down by Ollier. Nichols (7) in 1898 carefully described a method for the successful removal and regeneration of the diaphysis. He advised the subperiosteal resection of the shaft at about the eighth week after the subsidence of the acute process—that is, at a time when the periosteum had begun to form bone but had not yet formed a rigid tube. The periosteal cavity lined with a thin shell of bone was then disinfected with 95 per cent carbolic acid followed by alcohol, the inner surfaces of the tube approximated and the edges sutured with chromic catgut. The skin and muscle were closed over the periosteum

leaving small gauze or catgut wicks for drainage. Bone formation was palpable at the third week and went on to good functional results. Eight of the eleven cases reported in 1904 attained perfect results and the others were fair.

Our resections have been performed with one or two exceptions upon cases of chronic osteomyelitis which have had discharging sinuses from 4 months to as many years. The technique has been to resect as much of the diaphysis as has been diseased and to sew the periosteal edges together over perforated rubber drainage tubes, allowing the tubes to protrude from either end of the incision. The tubes have varied in size from the ordinary Dakin's tube to a large tube $\frac{3}{4}$ inch in diameter. The large tube was used in but a few cases. Dakin irrigations have then been carried out by means of the tubes and they have been allowed to remain for 2 to 5 weeks, depending upon the duration and character of the discharge. Regeneration of the bone has proceeded in most cases with surprising rapidity and the patients have attained a complete functional cure with but little deformity or shortening. There have been some failures of regeneration and these will be discussed with the presentation of the cases. The patients are kept in bed with extension for 8 to 10 weeks, then allowed to walk with crutches and a cast or brace till the sixth month and then allowed partial weight bearing with brace or cast till the eighth to tenth month.

CASE 1. J. P. A girl of 13 years entered the hospital in March 1920 with a 6 months history of swollen painful knee following incision and drainage of acute inflammation of the lower end of the left femur. Examination showed the left thigh atrophic with the knee fixed in flexed position, fixed patella, fluctuation of the joint capsule and two discharging sinuses in the posterolateral aspect of the lower end of the thigh. Operation was performed and the lower end of the femur found to be a mass of sequestra. Their removal resulting in a resection of the lower end of the femur. The periosteal cavity was packed with gauze and the leg placed in a hip spica cast. After the subsequent opening of abscess cavities 1

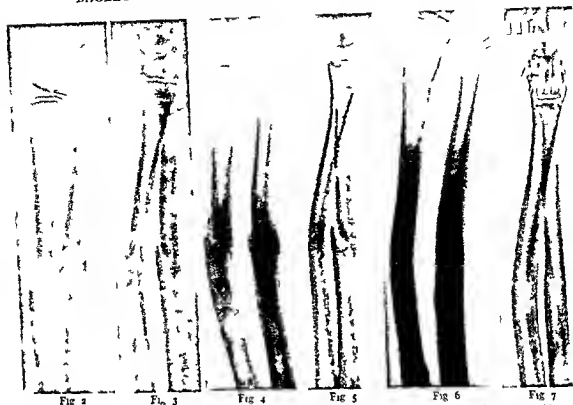


Fig 2 Fragments after final reduction (Case 1)
 Fig 3 Same patient as in Figure 2 lateral view (Case 1)
 Fig 4 Six weeks after the accident showing callus formation on the concave side of the deformity (Case 1)

Fig 5 Same patient as in Figure 4 lateral view (Case 1)
 Fig 6 Appearance of the radius and ulna 20 months after the injury (Case 1)
 Fig 7 Same patient as in Figure 6 lateral view (Case 1)

of function demonstrable. In 6 patients the end results were unsatisfactory in that there was present some deformity and loss of function due to arthritis and excess callus formation. Of these 6 unsatisfactory cases 4 were those of patients on whom an open reduction was performed. The remaining 2 and these were adults fall in the group in which reduction was only fair. It is noteworthy however that in the 18 cases in which actual reduction was only fair unsatisfactory end results occurred in only 2 instances and these 2 cases occurred in adults with completed bone growth.

These results we believe justify our point of view, namely that in the reduction of fractures of both bones of the forearm in children an imperfect reduction is preferable to an open operation. In order to bring out this point more clearly the study of 3 cases is given in detail.

CASE 1. C. B., a male 12 years of age suffered a fracture of the radius and ulna August 22, 1921. Several attempts were made to reduce the fracture by the closed method. There was some improvement after each manipulation but considerable displacement persisted as seen in Figures 2 and 3. These roentgenograms were taken after the final reduction. In the opinion of the radiographer an open reduction was called for because of the apparent close approximation of the lower fragments with the arm in complete supination. However the lateral view Figure 3 taken at the same time showed that there was a sufficient separation of these fragments to prevent ankylosis.

On the basis of this evidence the surgeon in charge decided to be content with the reduction obtained without operative interference. That this decision was justified is well indicated by the subsequent course of the case.

The patient's arm was kept in anterior and posterior plaster splints for a period of 6 weeks. The splints were removed at frequent intervals for massage and passive motion after the tenth day. Roentgenograms taken 6 weeks after the accident (Figs 4 and 5) indicate a satisfactory improvement.

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Fig 12



Fig 13

Fig 12 Position of radius and ulna 6 weeks after the accident in adult 60 years of age (Case 3)

Fig 13 The same arm lateral view (Case 3)

for Figure 13 the lateral view taken at this time is also negative for any previous injury.

CASE 3 is representative of cases in which the fracture occurred after the completion of bony growth. E. K. a female 60 years of age fractured the radius and ulna in 1919.

Reduction was effected under general anaesthesia but only a fair result was obtained as indicated in Figures 12 and 13 which roentgenograms were taken 6 weeks after the accident. The patient was discharged at this time complaining of some pain in the wrist but very little actual deformity. She was kept under observation until September 10, 1923. During this time there was practically no improvement in the deformity at the wrist. The pain on motion persisted and was more severe in bad weather.

At the last observation September 10, 1923 the original deformity was about the same. She complained of painful motion about the wrist of limitation of function and deformity. There was some atrophy of the muscles of the hand signifying non-use. Figures 14 and 15 represent the condition of the bones 5 years after the accident. In Figure 14 we see the same general deformity of the lower end of the radius and ulna as in Figures 12 and 13 taken 4 years previously. The periosteum and cortex of



Fig 14



Fig 15

Fig 14 Position of radius and ulna 5 years and 21 months after the accident (Case 3)

Fig 15 The same arm lateral view (Case 3)

the bone is slightly thickened. There is some arthritis of the wrist joint.

Comparing this case with the previous one both fractures being in the same location and of the same type we see marked difference in the subsequent course of a fracture that has not been perfectly reduced in a child and one similarly treated in an adult.

CONCLUSIONS

A study of 200 cases 176 patients being under the age of 15 years has been made to determine the end results of imperfect anatomical reduction of fracture of the forearm.

1. In children a good result may be expected even when a perfect reduction has not been obtained since there is much subsequent improvement as the bone growth proceeds.

2. In children complete fracture is more frequent than the greenstick variety when both bones of the forearm are involved.

sected (Fig 3). By this time a rather well marked foot drop had developed as a result of injury to the peroneal nerve while the head of the fibula was being curetted. In January 1922 suture of the peroneal nerve was performed and in September of the same year two years after the original injury the patient was walking without aid presenting some degree of foot drop $\frac{1}{2}$ inch shortening of the left leg some limitation of movement of the right knee and almost complete fixation of the right hip. In March 1925 the patient is walking $\frac{1}{2}$ mile to school and there are no signs of infection anywhere. The femur and tibia (Figs 4 and 5) have reformed strikingly although there is a 2 inch shortening of the left leg the leg in which the tibia was resected the femur being resected in the right. The shortening is apparently due to destruction of the distal epiphysis for both were somewhat involved and the resection included the entire diaphysis.

CASE 3 R M a white female developed an infection of the left foot at the age of 4 years which was incised by a physician with the evacuation of pus. There has been extension of this process over the body until she presents on admission to the hospital 1 year later on March 30 1921 three sinuses over the left clavicle two at the upper end of the left humerus one over the right forearm with extensive scarring and deformity of the wrist one over the upper end of the left femur and great thickening of the left ankle. The child had a most severe osteomyelitis and was in very poor condition. The following operations were performed April 15 incision and drainage of the left femur April 16 removal of sequestra from the left clavicle and left humerus April 29 resection of the right ulna May 6 resection of the entire left femur neck to the condyles June 17 incision and drainage of abscess of left thigh June 29 incision drainage and curettage of left mandible July 25 resection and curettage of the left tarsus. About a year later all wounds had closed the femur had entirely regenerated the ulna had failed to regenerate and the patient was leading an active normal life. In January 1924 she fell and struck the right hip and developed pain swelling and redness. This subsided but reappeared in April and the X ray showed complete destruction of the head with dislocation of the trochanter upward (Fig 6). This was undoubtedly an old process. The abscess was incised and drained but no connection was found with the bone or joint. Three weeks later a good sized abscess was discovered under the scar over the left humerus. This was incised and drained without there being any apparent communication with the bone. Both wounds healed promptly and hence 4 years after the first resection the patient presented complete regeneration of the left femur (Fig 6) with all motions of the hip joint free with good motion at the knee and with considerable shortening which is admittedly much less than it would have been had there not been the dislocation of the head of the right femur. The right ulna partially is absent the left humerus is solid but

irregular and the left clavicle has completely regenerated. There is slightly exaggerated mobility of the right elbow and wrist and the left foot is in slight valgus.

It should be stated that these resections were operations of necessity and not of choice. The practical results both healing and functional have been excellent. It is noteworthy that the reappearance of the disease after 2 years of entire freedom was not in the bones that had been resected and that the origin was probably in the left humerus which had been merely saucerized. The failure of regeneration of the small bone was seen here to be associated with the resection of the larger and better nourished bone, the femur.

CASE 4 M M age 10 months entered the hospital with several discharging sinuses over the left upper arm and with much tenderness along the whole length of the humerus. The disease began at the age of 2 months and the only operations had been small incisions for the escape of pus. There was almost complete ankylosis of the elbow joint but supination and pronation were good. Four days later April 25 1921 incision was made over the lateral aspect of the arm from the shoulder to elbow and almost the entire shaft of the humerus found to be much diseased and was accordingly removed with little difficulty. The periosteum was packed open with iodoform gauze and the arm placed in an extension apparatus. Two months later the X ray showed beginning bone formation. Extension was removed at about 6 months and progress seemed good until 10 months after the operation when a fracture was noticed there being no history of violence. Four months later union was good there was fairly good motion at the shoulder but still almost complete ankylosis of the elbow. Now 4 years later he has a firm bone with $1\frac{1}{2}$ inch shortening and moderate deformity. He has no sign of infection and has had no more fractures. Function is as good as could be expected with almost complete ankylosis of the elbow. The X rays show a solid thick humerus with no deformity except at the extreme lower end which is very irregular. This together with the fact that he had a pyogenic arthritis accounts for the stiff elbow.

CASE 5 I P a white male was operated upon for acute osteomyelitis of the right femur and tibia in 1920 at the age of 3 and a second operation was performed 6 months later at the same sites. He entered Lakeside Hospital 1 year after the onset of the disease presenting discharging sinuses over the leg and thigh with thickening of the femur and tibia. In July 1921 the entire diaphysis of the right tibia was resected and a month later the upper two-thirds of the femoral diaphysis of the same side. At the

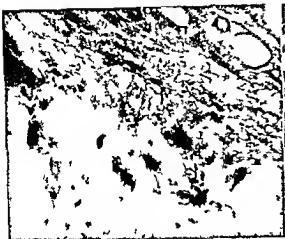


Fig 3 Photomicrograph showing section through placenta and uterine wall cornual region. Increased connective tissue and blood supply



Fig 4 Photomicrograph showing section through embryo, uterine wall and placenta illustrating the embryonic structure

offers is that the diagnostic possibilities are better in the city and the general hospitalization of city patients is more universal. Might not the greater prevalence of gonorrhoea in the populous centers furnish a rational explanation of the larger number of ectopic cases in the city rather than the less acute diagnostic sense of the physician in country practice? If the experience of other clinics coincides with ours I am sure gonorrhoea should be considered as the ranking etiological factor in ectopic pregnancy. In 8 consecutive cases, diagnosed as ectopic gestation in our clinic during the past 3 years 7 were operated upon. In the 1 case in which operation was not performed the vaginal discharge was positive for gonococci. In 5 of the 7 cases the gonococcus was demonstrated in the laboratory findings or the husband gave a history of recent active gonorrhoea. In the other 2 cases the husband of 1 patient reported gonococcal infection 2 years previously the second husband denied gonorrhoea but the wife reported definite childbirth infection.

INTERSTITIAL OR CORNUAL PREGNANCY

The relative frequency with which interstitial or cornual pregnancy occurs as compared with the other types ampullar or isthmal might be tentatively estimated by considering the statistics of several different

writers. In 77 cases observed by Martin the following distribution is shown: ampullar type in 48 cases, isthmal in 8, cornual in 1; the balance are of the tubal, ovarian, tubal, abdominal and undetermined types (6). In a series of 106 cases Oastler (7) found the isthmal type in 38 cases, ampullar in 32, cornual in 2, and in all others the type was undetermined. In 117 cases Fosskett (4) found the ampullar in 52, the isthmal in 64, and the cornual in 1. In a paper by C. Daniel (2) he reports that Waegeli had up to the year 1915 collected only 50 cases of cornual pregnancy, and in his paper he reports in his own experience only 2 cases. Di Palma (3) in his paper in 1920 reports only 2 cases that have come under his observation. Palmer in 1890 assembled 36 cases of pregnancy in the uterine horn including 12 by Kussmaul and added 2 new cases of his own. Conrad (1) added 11 cases from the literature up to 1923. In his paper he describes 1 case that came under his own personal observation. He is inclined to class all these cases as pregnancy of an accessory rudimentary horn. He states that in his cited case there was no communicating cavity from the accessory horn to the uterine cavity.

In our case there is ample evidence that the impregnated cornu is not an accessory horn as the communication from both the uterine



FIG. 6. C. G. 3. About 3 years after the resection of the left femur and just before the drainage of the abscess of the right hip. The deformity and shortening are apparent. The anatomical result in this case has been very poor but the functional and therapeutic results quite good.

entrance at about the junction of the middle and lower thirds.

CASE 6. G. G. a white male entered the hospital in February 1921 at the age of 3 with abscess of the right hip which was incised and drained. In September the process had again become acute and the entire upper half of the right femur was resected with the evacuation of large amounts of pus. Subsequent abscesses required incision during the next 2 months. In October 1924 he presented a solid femur with but $\frac{1}{2}$ inch shortening with flexion of the hip to the right angle, good adduction, fair abduction, good rotation and all scars healed solidly.

CASE 7. J. S. a white male age 10 years entered the hospital in November 1920 having had incisions made over acute inflammatory processes in both tibiae about a year before with incision and curettage at a hospital in another city 6 months before. He presented discharging sinuses over the lower halves of both tibiae and the ankles were swollen and of limited motion. There was an apparently healed sinus under the right clavicle. Both tibiae were carefully curetted, the right healed well and a small sinus persisted in the left. A year later the process in the right clavicle reappeared and the entire clavicle was resected subperiosteally. Four months later all sinuses were healed but in another month there developed an acute osteomyelitis of the external condyle of the left humerus with involvement of the elbow joint. This was incised, drained and healed with normal joint motion. The process in the left tibia then lighted up and the entire diaphysis was resected it being necessary to



FIG. 7.

FIG. 7.

FIG. 8.

FIG. 7. Case 5. Two and one half years after the original resection. The patient walked about well with the aid of a brace and is now undergoing operation for bone graft of the fibula into the tibia ends.

FIG. 8. Case 5. Showing fibula grafted into ends of tibia.

curette the talus with the establishment of a sinus through the epiphysis. The wound healed completely in 2 months and in 6 months the patient was walking without aid. Two years after the resection of the tibia the patient returned complaining of pain in the leg and the X-ray showed an ununited fracture of the regenerated portion of the bone. There was slight evidence of inflammation which has disappeared on the application of a cast and the union is now very firm. The ankle is ankylosed and there is no evidence of infection in other bones of the body.

CASE 8. A. M. a white male entered the hospital in November 1921 at the age of 17 years. He had been operated upon twice before with saucerization procedure the last time in 1916 and had remained entirely healed for 4 years. The X-ray showed osteomyelitis of the lower end of the femur and that portion of the bone was resected. The progress was excellent, the patient walked with a cane in 4 months and the discharge had entirely ceased in 8 months. Ten months after the resection the patient fell and broke the regenerated portion of the bone with opening of the old sinus. Eight months later the discharge had entirely ceased and there was good union but

as a possible ruptured ectopic pregnancy. He prescribed quiet, cold packs and remedies to combat the shock. On the next day the patient had some what recovered but was having periodic attacks of hard pain which if attended with the least exertion caused fainting spells. She entered the hospital on the afternoon of that day with the following condition and physical findings:

Physical findings. The patient was a poorly nourished thin individual markedly under the effect of opiates. She had had four quarter grains of morphine in the past 12 hour. There was a medium degree of pallor, no sighing respiration or evidence of presence of shock as reported in her history. The pulse was 100, axillary temperature 99.8. The chest was normal, abdomen much distended, apparently full of gas. There was much rigidity over the entire abdomen with no especial tender point. Bimanual examination showed the uterus slightly fixed and enlarged, no palpable masses could be determined either in the cul de sac or in the adnexa. The pelvic examination was unsatisfactory on account of the distention. The size of the uterus could not be accurately determined and the cervix had a soft feel. There was a free pus discharge from the cervix of thick creamy character with very little odor. There was no blood in the discharge.

Laboratory findings. Hemoglobin 65 per cent, red blood cells 3,000,000, leucocytes 25,400, differential count indicated polymorphonuclear leucocytes predominating, blood pressure was 126/72, urine normal. Examination of the vaginal discharge revealed the presence of gonococcal infection.

Diagnosis. A tentative diagnosis was made of pelvic infection with peritonitis, first ruptured tubal pregnancy, second.

Conduct of case. The patient was put in the charge of a special nurse with instructions to follow the pulse and report accurately on the general condition. During the afternoon the patient suffered one fainting spell at which time the pulse reached 120 but remained of good quality. The temperature in the evening reached 100.6. On the second day the patient seemed improved, a repeated vaginal examination gave the same findings as previously recorded. At times there was some slight bloody discharge from the uterus, never any bulging in the cul-de-sac.

The only treatment employed was cold packs to the abdomen and sterile hot douches once daily and enemas for gas. The progress of the patient during the next 12 days was one of gradual improvement. For 3 days prior to the operation the temperature had remained normal and the pulse had followed a range from 84 to 90. The abdomen had become considerably less rigid and was not painful on palpation. Bimanual examination showed the uterus fixed with a more prominent firm mass in the right side of the pelvis, closely attached to the fundus uteri, and the cervix was more firm than on

first examination. There had been an occasional slight bloody discharge and a considerable lessening of the purulent discharge. The blood examination showed 14,000 leucocytes and a slight increase in red cells. The blood pressure was 115/70. The patient was feeling very much better and demurred somewhat on accepting surgical treatment. The operation was performed April 7 under ether anesthesia.

Operative findings. A median incision was made. The peritoneum was considerably discolored giving evidence of hemorrhage in the abdominal cavity. Quite dense lines of omental adhesions were found along the site of the previous operation which had been a right median incision. After these and the newer recent adhesions were loosened a large quantity of clotted blood was removed. Great care was taken not to severely traumatize the coils of intestine which had been sealed together and to the uterus with the clotted defibrinated blood. Probably a pint of blood serum was sponged from the abdomen. After the adhesions were freed the tubes were carefully visualized and it was noted that there was a rupture of the right tube at the cornu of the uterus from which there was oozing of bright blood. The procedure determined upon was a subtotal hysterectomy. This was done in the usual manner. The left adnexa which was apparently normal was left in place. A glass drainage tube from the cul de sac was used and the usual closure made. The time consumed in the operation was 40 minutes. The period of her recovery was uneventful and she was dismissed from the hospital in 13 days.

Examination of specimen removed (Fig. 1). The gross specimen as photographed shows the uterine body slightly larger than normal and of firm consistency. On the left the fundus is of normal shape and none of the adnexa is attached. On the right side there is a mass about the size of a small lemon bulging out from the fundus. On the posterior surface the peritoneal coat is smooth and unbroken. On the anterior surface there is a roughened condition of the peritoneal coat evidencing adhesions and at a point on the anterior wall there is also evidence of the source of rupture. The right horn where the mass appears is considerably higher than the cornual region on the left. The mass is of about the same consistency as the fundus of the uterus. The tube on the right side is attached.

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the knee. There is a inches shortening of the extremity partly due to deficient traction. This is the maximum shortening that has occurred.

CASE 11 E P a white girl at the age of 12 developed an ulceration of the leg at the junction of the upper and middle thirds. The Wassermann was positive and the ulcer responded to antiluetic therapy remaining healed for 1 year. The ulcer again recurred exposing the bone this time and both bones of the leg were fractured by a fall with healing of the fibula but only fibrous union of the tibia. In the fall of 1922 the condition had become so bad that the necrotic shaft and the lower epiphysis were simply lifted from the leg being surrounded by a large amount of foul pus. Excellent healing of the wound occurred with regeneration of the upper half but not of the distal half.

It should be stated that there was nothing to do but remove the epiphysis in this case for the entire bone was one necrotic mass. The case is considered to be luetic osteomyelitis. What effect the removal of the epiphysis may have had upon the future to regenerate completely is a question. Suffice it that the process has been entirely cured and complete function may be secured by a small bone graft.

CASE 12 L F a white female of 7 years complained of pain over the right tibia. The bone was bowed anteriorly and presented much thickening but there was no discharge and no fever. A diagnosis of non suppurating sclerosing osteomyelitis as described by Garre (5) was made. The tuberculin and Wassermann tests were negative and the patient was given antiluetic treatment as a therapeutic test without results. Resection of the entire diaphysis was performed in October 1922. No pus or cavity was found but the bone was very markedly eburnated and the medullary cavity almost obliterated. In December 1924 her doctor reported an entire cure with healing regeneration and good function.

We would not recommend this treatment for this disease usually for it is found that they are greatly improved by multiple trephining of the cortex but the result in this one case was excellent. Jones (6) gives a review of the literature and describes a case and Blood good (2) reports several cases encountered in a relatively short period indicating that it is probably more common than often supposed.

CASE 13 J H a white male of 7 years entered the hospital first in 1921. The diagnosis was cervical Pott's disease and the patient was placed on a Bradford frame for a year. In November 19 swelling and pain developed over the head of the left fibula which was resected. He entered the hospital 8 months

later with an abscess of the neck. The fibula at this time was completely regenerated although somewhat deformed. Culture of the abscess revealed staphylococcus albus and the patient was treated with autogenous vaccine. The case is considered to be an infectious osteomyelitis and not Pott's disease as originally diagnosed.

CASE 14 A M a white male age 40 years was admitted to the psychiatric service Cleveland City Hospital July 5 1923 with manic depressive psychosis of suicidal nature. The patient was very depressed and had chronic osteomyelitis of the shaft of the left femur of 9 years duration. Operation in another hospital 3 months previously. Blood and spinal fluid Wassermann negative. Operation Cleveland City Hospital January 4 1924 Subperiosteal resection of 7 or 8 inches lower end of shaft of left femur above condyles. July 10 1923 a pre operative X ray of the lower third of the left femur showed roughening thickening and a large area of destruction. March 16 1924 and February 15 1925 X rays showed some areas of calcification in the periosteum. March 2 1925 there was moderate bone regeneration but no union with condyles. March 12 1925 the patient's condition was poor. He was melancholic and often refused food. Drainage had practically ceased. The patient would not permit a cast splint or other means of support to be applied. We could not secure a permit for amputation. Summary: The temperature was normal or subnormal except for elevation to around 38 degrees C for 2 weeks following resection. The ends have been allowed to come together by removing traction. Union may yet occur or might follow a short bone graft.

CASE 15 E H a white female entered the hospital in May 1924. She first became ill at the age of 3 and has had a chronically discharging sinus at the lower end of the femur ever since. She has had 9 operations upon the left femur the last 4 months before entrance to the hospital. A resection of 3 1/2 inches of the lower end of the femur was performed followed by an unusually mild reaction. The patient was referred home under the care of the family physician. In April 1925 there was no sinus. The X ray showed complete regeneration the alignment was very good and there was less than 1 inch shortening (Fig 12). The patient is walking a little without support.

CASE 16 M B a colored female age 11 years entered the hospital in August 1924. A year previously she had developed a painful swelling over the left fibula which was incised by a doctor. Since that time she has had no pain but has had a discharging sinus.

Examination shows two sinuses over the left tibia just below the knee. The tibia is thickened and roughened and somewhat larger than the right. The X ray shows osteomyelitis of the upper half of the tibia. On August 27 a portion of the shaft of the bone extending 4 1/2 inches from the tibial spine was resected. There was one cavity lined with soggy

following gastro enterostomy its frequency varying according to those making the report. It is also accepted that hæmorrhage may recur after gastro enterostomy in 1 per cent of duodenal ulcer cases and 2 per cent of gastric ulcer (Balfour) but it is to be remembered that hæmorrhage occurs in less than 25 per cent of chronic ulcer cases. In most cases in which no ulcer is present hæmorrhage is due to superficial erosions caused by toxic hepatitis a result of focal infection (Mayo). Or it may be due to cirrhosis of the liver splenic anæmia, or other causes.

The incidence of gastric carcinoma whether it is believed to result from the degeneration of the edge of a chronic ulcer or to have existed from the start as a carcinoma which is indistinguishable either before operation or on the operating table, is another argument in favor of surgical treatment of gastric ulcer. Great difference of opinion still exists as to the frequency of the degeneration of gastric ulcer into gastric carcinoma. This has varied between the figures of 70 per cent in the original reports of several years ago from the Mayo Clinic to less than 2 per cent according to the figures of Wilenski. It is certainly of significance however that the cases studied by an actuary of one of the large insurance companies showed that the life expectancy after operation for duodenal ulcer was the same as that of the normal population of the same age while the death expectancy in cases operated on for gastric ulcer was three times as great. Balfour later revised his earlier figures on the degeneration of gastric ulcer into carcinoma showing that a considerable number of the patients from the Mayo Clinic operated on for gastric ulcer died within such a short period after their discharge from the hospital that it is fair to assume that carcinoma was present at the time of operation. In a number of instances subsequent careful examination of specimens removed from these patients showed carcinoma in some portion of the ulcer. A study by von Eiselsberg of 41 late deaths after operation for gastric ulcer in which 23 postmortem examinations were performed showed that 13 were from carcinoma of the stomach. Also statistics of Joslin of

the Massachusetts General Hospital showed that 24 per cent of the late deaths following gastric ulcer were from cancer of the stomach. Time does not allow here a further consideration of this subject which was more thoroughly analyzed in an article by me on "Carcinoma of the Stomach," published in 1919.

After all facts are better than argument and the ultimate results of both forms of treatment may best be measured by a study of the end results of not one but several large groups of cases. This is extremely difficult except by a long continued persistent and careful follow up because of the known periodicity of symptoms and frequent amelioration of all signs of indigestion in the patient whose ulcer either becomes quiescent or else clears up only to recur.

A large number of reports from the medical clinics where the follow up has been continued over a long period are more difficult to obtain than surgical reports. A considerable number however have been published within the past few years. Sippy stated that he cured 85 per cent of cases of pyloric obstruction of all grades due to ulcer by his method and that only one half of the remaining 15 per cent needed operation. Brown states that the advocates of both surgical and medical treatment claim a cure of from 75 to 90 per cent of ulcers but says that certainly this number is not really cured by either medical or surgical procedure. Eggleston reports on 156 cases which have been treated medically and have been free from symptoms for a period of 3 years. One hundred and thirteen 72 per cent reported no return of symptoms and 43 28 per cent reported recurrence. In this report 80 per cent were ideal cases for medical treatment in that the patients were well nourished had no pyloric stenosis, and had no indications of a tendency toward perforation.

Several reports have been made as to the end results of surgical treatment. Mayo states satisfactory results were obtained in 83 per cent of gastric ulcer and in 90 per cent of duodenal ulcer cases without excision. Ninety five per cent were cured surgically but more than one operation may have been necessary in 1 or 2 per cent of the cases. The



FIG. 13. Case 16. *a* Showing involvement of the bone before operation. *b* Two and one half months after re-

section of $4\frac{1}{4}$ inches of the shaft. *c* Eight months after resection.

had merely been stuccoed (Case 3). A second operation upon the bone resected has not been necessary in any of these cases.

There are 7 other cases which we are not including in the report which have been done very recently and are still in supports. There are 4 femora which are regenerating well and 3 tibiae 2 of which are failing to regenerate.

DISCUSSION

As with any procedure it is best to employ some selection of cases to which the remedy is to be applied. Nichols (7) and Clopton (4) have stated that the tibia is a favorable bone for resection because of the adjacent fibula which acts as a splint. Both of these authors had trouble with the tibia although the latter author feels that bone grafting can be effectively resorted to and makes the resection operation quite successful in the event of failure to regenerate. However our experience and that of Beye (1) who reports great misfortune in a group of 5 cases the four tibiae failing to regenerate and the 1 femur developing a shortening of 3 inches makes us hesitate to recommend resection of the tibia except in cases of necessity when anything less radical will not

remove infected bone. In these if regeneration is incomplete a bone graft may be inserted with good prospects of a useful leg. In many cases of osteomyelitis of the tibia one or both ends are involved with a section in the middle which appears more or less normal in the X rays. It is possible that this central section could be saved making necessary the filling in only of the short section at either end. This was tried in a recent case not included in this report and is offered merely as a suggestion. The femur on the other hand has great powers of regeneration and if persistent and sufficient traction is applied the shortening need not be great. It is interesting that Simmons (9) should state that resection of the femur is impossible.

The reason for the failure of some of the bones to be replaced probably lies in the relatively deficient blood supply of the tibia and the bones of the forearm and the constant regeneration of the femur is probably explained by its rich blood supply. We have made no study of the calcium metabolism of our cases and it is possible that such a study might throw some light on the failure to produce new bone. Age apparently has no

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ulcers of the stomach which are of the penetrating type call for surgical treatment. It is very likely that those cases in which a large deforming ulcer of the body of the stomach exists have little prospect of cure by other than surgical means. Surgery should not be used in acute cases or in those with a short history or a history of never having had the benefit of adequate proper medical treatment. A gastric residue does not necessarily mean an organic stenosis of the pylorus as reflex spasm and edema may be a large factor in causing the retention and this may often be relieved by medical means. And in most instances this should be attempted. But it would appear that a large percentage of these patients is relieved not cured and the symptoms will recur.

The operative mortality is of course advanced as an argument against surgical treatment and justly so but the operative mortality in uncomplicated cases of duodenal ulcer is small. Mayo reports 1 to 2 per cent. Crile in cases of simple gastro-enterostomy alone less than 1 per cent. Scudder in 171 gastric ulcer cases reports a mortality of 7.6 per cent in 139 duodenal ulcer cases 6 per cent (but does not state whether this included cases of perforation). Pool in 70 cases 7 per cent but it is not more than fair to state that of the 5 deaths 1 was due to delirium tremens and 1 to septicemia following mastoiditis. The operative mortality in the St. Luke's series has already been given.

The death rate following the more extensive operations such as resection, trans-gastric or mid-gastric and the various types of pylorotomy one would expect to be higher. But the type of cases requiring such operation are just the ones in which the prospect of cure by medical treatment is least, the symptoms most severe and the possibility greatest of the presence or the development of carcinoma. In such cases also must be considered the danger of perforation even while one acknowledges that perforation may frequently occur from an acute pathological process without the previous existence of an old chronic indurated ulcer. In the hands of the skilled gastric surgeon even these more radical operations show a surprisingly low

mortality. Haberer has published a report of 256 Billroth I operations or modifications thereof for gastric and duodenal ulcer with a 5 per cent mortality, while in resection for duodenal ulcer Friedman reports a 2.6 per cent mortality in 115 cases, and Finsterer 3.6 per cent in 272 cases.

Solution of the second problem, the choice of operative procedure cannot be accomplished by the theoretical establishment of an ideal procedure and the effort to attain that ideal. Lack of knowledge of all of the etiological factors entering into the cause and recurrence of ulcer prevents the determination of an exact cure. In duodenal ulcer, gastro-enterostomy even if not ideal, has been acknowledged by most American surgeons to be a successful method of treatment. If the ulcer is in the anterior wall, it may be excised or cauterized and possibly the small number of hemorrhages occurring after gastro-enterostomy lessened. But even this is uncertain. In 1 case of perforated ulcer operated on about 4 years ago in which the edges of the perforation were excised, the perforation carefully closed and the area infolded and a gastro-enterostomy performed, a rather severe hemorrhage subsequently occurred but this was found to be due to a jejunal ulcer. In 2 other patients operated on about the same time both of whom had developed severe hemorrhages before operation, and in 1 of whom two transfusions were necessary before operation, nothing but gastro-enterostomy was done, both were perfectly well and had no recurrence of any symptoms when seen recently. In the ulcers of the posterior wall those which are most prone to bleed excision of course is not practical.

Gastro-enterostomy, however, has fallen into more or less ill repute. I do not believe this is deservedly so. Of course if not properly placed, if too large, if the distance from the duodenojejunal junction is too long or so short as to produce tension or allow kinking or angulations, if the edges of the anastomosis are not carefully sutured, the maximum physiological function will not be attained. I have seen a gastro-enterostomy so large that everything entering the stomach practically fell into the jejunum. Of course under

A CONGENITAL CYSTIC TUMOR OF THE NEURENTERIC CANAL WITH SPECIAL REFERENCE TO ITS HISTOLOGY AND PATHOLOGICAL SIGNIFICANCE

By G. H. HANSMANN, M.D., IOWA CITY, IOWA

From the Pathologic Laboratory of University Hospital

Of all the pathological conditions encountered between the rectum and sacrum tumors are to me the most puzzling. I include in this class the intradural and extradural tumors situated between the conus medullaris and coccyx. The disturbing features are the number of tissues found in a single tumor, the histologically malignant tissue encountered and the inability to predict accurately in the absence of a well grounded explanation for the origin of the condition what will happen when a given tumor is apparently removed. The case reported shows what may happen along the course of the neurenteric canal and the facts involved will serve as a basis of a conception of most of the pathological conditions found in this region.

Case report. Path No. 12412. House No. 60400. Clinical history. The patient was a female infant 1 day old brought into the hospital December 27, 1923, to have a harelip and cleft palate repaired. Operation was attempted January 16, 1924. During the operation the child became very cyanotic and operation was discontinued. She died the following day at 1:43 p.m. of bronchopneumonia.

Necropsy findings. The body is well developed and well nourished. Weight is 2,801 grams. Skin is cyanosed. There is a cleft palate and double harelip and a congenital coloboma of each eye with elongation of each pupil toward the nasal cavity. The lower portion of the right lung is consolidated. The right lung receives two primary bronchi. The heart shows both great arteries arising from the right heart, a patent ductus arteriosus, patent foramen ovale and imperfect interventricular septum. The aorta arises to the right of the pulmonary artery and is separated from it by a wedge shaped piece of muscle. The cæcum is directly beneath the liver and has a mesentery. The kidneys show ununited tubules forming what might be termed polycystic kidneys. There is a double vagina and uterus.

The lower lumbar vertebrae and the sacrum are removed *en masse*. This is done because in the pelvis a mass measuring 6 centimeters in diameter is attached to a defect in the anterior surface of the sacrum by a pedicle about twice the size of a lead pencil. The vertebrae are then split and the accompanying photograph illustrates the pathology better

than any description can. The third sacral vertebra is gone and the congenital cystic tumor passes into the bony canal at this level and is attached firmly to the anterior surface of the cord. The tumor is cystic and many of the cysts contain mucus. The relative size and position of the cysts can be made out in the photograph.

Histological report. The tumor presents the only interesting histological finding. The pedicle shows dense glia fibrils and resting glia cells. In the glia tissue are a few cells that appear to be ganglion cells but they do not stain well and cannot be definitely identified. There is also a small canal lined by ependyma. A little nearer the sacrum there are cells and arrangements of cells which at once suggest the tumors arising from this region diagnosed as ependymal gliomata. The cysts contain columnar epithelial lining and the surrounding more solid tissue shows stratified squamous epithelium. Most of these findings are shown in the accompanying photomicrographs. In addition the tissue contains a collection of lymphoid cells, fat, a few small islands of cartilage, some smooth muscle, myxomatous appearing fibrous tissue, nerves and quite large blood vessels. The phosphotungstic acid hematoxylin stain shows that the cells having the arrangement of the so called ependymal glioma tumors produce abundant glia fibrils. At the point of junction with the cord the structure resembles closely that of a closed spinal cord except that the horns are not formed. The position of the blood vessels, the glia in parallel arrangement, the so-called replacement gliosis together with the shape and size of the pedicle and even the small canal lined by ependyma are all reminiscent of a spinal cord.

At the beginning of the third month of embryonic life the neural tube extends the full length of the neural canal and is in close relationship with the deep layers of the skin. The bony canal grows rapidly, the cord fixed above is drawn away from the coccyx, the atrophied caudal extremity forms the filum terminale. The skin connection is evidenced by the caudal ligament and in certain cases by a postanal dimple or sinus. During early embryonic life there is a communication around the caudal extremity of the notocord between the central canal of the cord and the alimentary canal. The proctodæum or primitive anus invaginates and joins the cloacal

While the mortality from these radical operations in the hands of the skilled gastric surgeons has not been very large, it must be, that if the surgeon not doing many such extensive resections adopts this method many more cases will be lost than if a less radical procedure were followed. And it is also my belief that perhaps the end results following these radical procedures if followed over the long period that gastro enterostomy with or without excision or the methods of pyloroplasty have been followed, may not justify the increased danger and be entirely free of any and all unpleasant sequelæ.

In the operative treatment of gastric ulcer the excision of the ulcer if large is the ideal to be attained. If the ulcer is in the pyloric region excision may best be done by a pylorotomy after the Polya Balfour or the older Billroth II method. The former is easier more rapid and gives better functional results. In a recent article Woolsey especially favors this type of operation and our statistics at St. Luke's show the lower mortality and good end results after the Polya Balfour resection. It is my belief that a small entero-anastomosis between the limbs of the loop below the point of anastomosis will improve the results of the Polya operation. Some of these large indurated ulcers cannot be distinguished from carcinoma at the pylorus and I have in 3 instances done a pylorotomy for what I believed to be carcinoma. The macroscopical examination showing no carcinoma cells in a large greatly indurated ulcer.

If the ulcer is small on the lesser curvature near the pylorus excision with the knife or cautery or the Balfour method of cauterization plus gastro enterostomy has given the best results according to our statistics. I do not believe that excision alone without gastro enterostomy will cure most of these patients. Strauss has recommended the resection of the lesser curvature of the stomach in such cases combined with a removal of a considerable portion of the pyloric muscle to shorten the emptying time and allow regurgitation into the stomach. With this procedure I have had no experience.

Small ulcers of the posterior wall may be excised by the transgastric method but in

the case of larger ulcers of the lesser curvature and posterior wall, the midgastric or sleeve resection is the operation of choice. This applies particularly to those cases in which the ulcer is situated at such a distance from the pylorus that a pylorotomy is not indicated and in which the stomach is of the hourglass type. Contrary to some reports, these patients usually do well with relief of symptoms, and although the hourglass deformity may sometimes partly return as shown by follow up roentgenographic examinations they rarely show the retention present before operation.

Those ulcers situated high up on the lesser curvature, often of the penetrating type sometimes adherent to the liver, are most difficult to deal with. In 2 cases of my own a resection of the adherent portion of the liver which formed part of the base of a large ulcer allowed a pylorotomy in one instance, and a midgastric resection in another. In both instances the lesion was believed to be carcinoma. The hæmorrhage from the liver was easily stopped by means of suture and both patients recovered. In some cases however the adhesions are so dense that the lesser curvature cannot be freed and in such the choice of procedure lies between a gastro gastrostomy and a gastro enterostomy. In one patient of mine with such a condition symptoms of ulcer having been present for 16 years the patient was greatly relieved although not entirely cured of occasional symptoms by a gastro gastrostomy. This patient was reoperated on 2 years ago the X ray showing obstruction in the descending colon as well as gall stones. There was an inflammatory band obstructing the colon and division of this band together with cholecystectomy relieved the symptoms. The stoma between the gastric pouches remained of good size and functioned well.

For high ulcer of the lesser curvature gastro enterostomy theoretically, should cause little benefit and this statement is made in most articles on gastric surgery, but excision is most difficult and it is of much interest to note that in 3 cases of such nature in the list of cases analyzed from St. Luke's Hospital this seemed to be the only possible

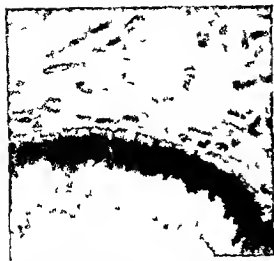


Fig 4 High dry (X200) Showing cyst lined by high columnar epithelium

to remember Keen and Coplin (5) reported a case in a child aged 2 who had a fistula passing through the sacrum and connecting the rectum with the skin over a congenital tumor on the posterior aspect of the sacrum. The anatomy of the tract was not worked out but we are inclined to assume that both the neurenteric canal and distal portion of the neural tube remained patent and that the



Fig 5 High dry (X200) of tissue resembling the arrangement of open lyml gloma tumors of this region

opening over the sacrum corresponded to the opening of a sinus in some of the embryos studied by Mallory. Accordingly the origin of tumors over the sacrum has been well explained the origin of those arising between the rectum and sacrum has been suggested but no attempt has been made to explain the peculiar tumors found in the spinal canal between the conus medullaris and the coccyx.

It is important to compare the condition found to the histology of tissue from the canal and to determine whether or not this pathology is located in the course of the canal. The cases from three (2, 3, 8) important papers are brought together in a table to show the relationship of intradural and extradural tumors situated between the conus and coccyx and this congenital structure.

The tumors tabulated all lay in the course of the canal and in 1 case perforated the sacrum anteriorly and in another connected with a cyst in the pelvis through an anterior defect in the sacrum. The tumors compiled in the table are histologically similar to our case. It is recognized that tissue in the filum terminale might give rise to similar growths and therefore the tumors arising from congenital remnants in this region do not necessarily originate in the neurenteric canal.



Fig 6 Low power (X60) of cyst lined by stratified squamous epithelium. Cyst is filled with detached flattened epithelial cells.

the patient has recovered from one severe hæmorrhage when the X ray shows marked deformity particularly in gastric ulcers and when the condition has been present for a long time

II Choice of operative procedure

1 Gastro enterostomy with or without excision and the various method of pyloroplasty are not ideal procedures because they do not remove all the etiological factors of ulcer

2 According to most of the American and English statistics the average percentage of cures is in the neighborhood of 85 to 90 per cent

3 Sometimes the complications of jejunal ulcer may be worse than the original lesion

4 Although the continental statistics and the percentage of cures of a few American surgeons show unfavorable results after gastro enterostomy with or without local excision our follow up at St Luke's Hospital New York, and most American statistics do not appear to justify radical gastric resection for duodenal ulcer or small gastric ulcer

5 Careful technique pre operative preparation and after care of the patient will lessen the mortality and increase the number of cures without radical operation

DEPARTMENT OF TECHNIQUE

THE PROBLEM OF BRINGING FORWARD THE RETRACTED UPPER LIP AND NOSE¹

By A. P. BLAIR, M.D., F.A.C.S., St. Louis, Missouri

RETRACTION of that part of the maxillæ which forms the foundation of the cartilaginous nose and related part of the upper lip may cause changes in the human face that may vary from not pleasing to hideous deformity.

The abnormality is more evident when viewed in profile.

The cases observed by the writer have fallen into the following etiological groups:

A. Those of apparently natural occurrence.



a



b



c

Fig. 1 a. A young girl who originally had a sad face in conjunction with a moderate amount of flattening of the maxillary bone in the neighborhood of the anterior nares and proportionate anteroposterior shortening of the septum. She had been previously treated by the implantations of cartilage into the upper part of the dorsum which accounts for the prominence of the bridge.

Fig. 1 b. The result of the implantation of a triangular shaped piece of the right eighth costal cartilage through an incision with the nostril after removing one of the original transplants. At a later operation another strip of cartilage was implanted upon this triangular piece to raise the tip further. By these operations the dorsum, the alæ and tip of the nose, the cheeks and upper lip have been brought forward. The amount of this forward movement is more easily seen in Figure 1 c.

Fig. 1 c. Superimposed tracings made from positive negatives taken when the girl first came to us and after the completion of our second operation. This is a somewhat simple but usually not the most satisfactory plan of treating such cases. If there is much strain the cartilage is apt to bend and we have had to remove it in cases where the bone is more rigid, but if rib is used it may not give sufficient



a



b

Fig. 2 a. If in a case similar to that presented under Figure 1 the attempted correction is made by the insertion of a strip of bone such as may be obtained from a rib on some plan is adopted to hold forward the lower end of the graft until bony union occurs, the tip of the nose will still lack prominence. This illustrates such a condition with a rib graft solidly united to the dorsal surface of the bony bridge.

Fig. 2 b. The result shown as obtained by lengthening the columella by means of a strip slid from the central part of the lip and at the same time chiseling the nasal bones free from the attachments to the maxillary and frontal bones and the nasal septum. The nose was then pushed forward and held in a more desirable position until union occurred. This was done by means of a metal bar which had a dental anchorage below and passed up into the right nostril between the lip and the maxillary bone. This complicated and not overly satisfactory splint was ingeniously contrived by Dr. J. A. Bown, D.D.S., to meet the patient's objection to the long detention from his business that an external splint would have caused. The latter would have given greater final prominence to the tip of the nose. Figure 2 b does not do full justice to the result because it is not a true profile.

From the St. Louis Department of Plastic Surgery, St. Louis Hospital, St. Louis, Mo. Received for publication, December 6, 1934.

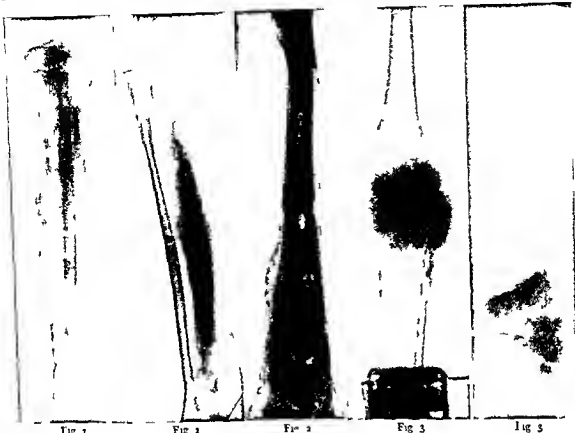


Fig. 1 Case 2 Note the involvement of the tibia from one epiphysis to the other. The entire diaphysis was resected and lifted out of the periosteum with little effort.

Fig. 2 Case 2 Showing the marked bony involvement

of the right femur before operation also fracture from attempted reduction of dislocation of hip.

Fig. 3 Case 2 Showing the extent of the resection of the femur about 6 inches.

and 2 months later respectively healing and regeneration of the bone progressed with final cessation of the discharge about 18 months later. Two years after the operation the femur was found to be much bowed anteriorly probably because traction was not used and too much reliance had been placed upon the cast. The knee was ankylosed and the foot in equinus position. A tenotomy of the Achilles tendon was performed and a month later the patient fell while wearing a cast fracturing the regenerated portion of the femur. Union occurred rapidly and now 4 years after the operation the patient is walking well without pain without discharge and with 23 inches shortening.

The progress of this first case does not sound alluring and yet the result has been much better than after many less radical procedures.

CASE 2 I O a white boy of 9 years injured the left foot on a nail in September 1920 the wound becoming infected and being incised at a hospital

Two months later osteomyelitis developed in the left tibia which was incised and drained. After another 2 months pain developed in the right hip and the X ray showed dislocation which was reduced under anesthesia but soon recurred. Six months later in March 1922 he entered Lakeside Hospital presenting dislocation of the right hip with osteomyelitis of the femur two sinuses over the left tibia one over the left fibular head and a small nodule over the head of the second right metacarpal which 3 or 4 months before was tender and reddened but had receded spontaneously. The patient was in very poor general condition with marked toxic manifestations. Attempt at reduction of the hip resulted in fracture of the femur. Three weeks later incision over the left tibia showed the bone to be so badly diseased (Fig. 1) that the entire shaft could be lifted out with very little effort. At intervals thereafter incision and curettage of the following sites was performed: head of left fibula, head of the right second metacarpal and right internal malleolus. In August 6 inches of the lower end of the right femur was re-



Fig 6 When the foundations as well as the upper lip and nose have been deformed, much can be gained by transplanting the cheeks forward after the plan described under Figure 4 before attempting to build the lip and nose.

Fig 6 a Profile of a man who had a number of years previously lost from an ulceration the whole nose, part of his cheeks and lip and the anterior half of the palate and alveolar processes of the maxilla.

Fig 6 b The result obtained by freeing the cheeks and suturing them forward.

Fig 6 c Final result after the nose and lip were made from a bald scalp flap and a cartilage was implanted into the bridge.

tion which will vary with the type of repair employed. Usually it is most pronounced in the alveolar part, permitting a backward displacement of the upper lip with or without some snubbing of the nose but in cases in which a V has been cut from the lower free border of the septum to



Fig 7 a A common deformity that may follow a barrel operation in which the premaxilla was moved back is a lateral spreading of the nostrils, an extremely short columella, and snubbed nose.

Fig 7 b and c Show such a case treated after the plan detailed under Figure 3, plus the excision of a diamond shaped piece of skin and subcutaneous tissue from the base of the columella and upper part of the lip.

move back the premaxilla, the nasal snubbing may be the most noticeable feature.

The common characteristic of these cases is a receding upper lip or the tip of the nose or both, but the abnormal anatomy producing this retraction varies in different cases both in kind and degree and must be considered in seeking the most appropriate plan of correction in each instance. In general there are two surgical plans applicable to the correction of this condition: one is to build out the deficient maxillary foundation, thus pushing forward the retracted soft tissues; the other is to draw them forward and fix them in this position. A combination of these two plans will often give the best results.

The retracted maxilla may be built out or supplemented in a number of ways.

Orthodontic treatment will give very great help in some cases when they are seen early.

We have used the following plans to build up the bone about the orifice of the anterior nares: the implantation of cartilage; the use of a dental prosthesis after the soft tissues have been liberated from the periosteum of the maxillary bone and the sulcus has been lined with Thiersch grafts; the cheeks have been liberated from the maxilla and sutured in a forward position and the lining of the nasal tube has been lengthened with a flap from the forehead, arm, or the mucosa of the mouth. The soft tissues have been drawn forward and suspended in this position either by the implantation of cartilage or bone between the skin and framework of the dorsum of the nose or by suturing the liberated columella in a forward position on the lower border of the septum.

There is a type of retracted nose in which the septum and the columella are both short, part of the cartilage of the latter being buried in the lip. The columella is also short in the complete double congenital cleft of lip and palate. In these cases the columella will have to be lengthened in order



Fig 7 d The diamond shaped piece of skin and subcutaneous tissue was excised from the base of the columella and upper part of the lip. This little step decreased the septolabial angle. The excessively long lip will be shortened at a subsequent operation.



Fig. 4. Case 2. Showing right femur 4 years after resection of about 6 inches of shaft. Note apparent medullary cavity.
Fig. 5. Case 2. Four years after the resection of the left tibia. Note the apparent medullary cavity.

end of 16 months there was some discharge from the region of the left hip and removal of a small sequestrum was performed. The femur had regenerated to the size of the original bone but there was absence of the mid portion of the tibia (Fig. 6). The boy has walked very well with the aid of a brace and there has been no evidence of infection for 2 years. There is ankylosis of the hip with $1\frac{3}{4}$ inches shortening of the right extremity. The fibula has been grafted into the tibia (Fig. 8).

It is interesting that these two cases of non-regeneration have occurred in patients in whom the femur was resected soon after the resection of the small bone. The question is whether or not these bones would have re-

generated if there had not been regeneration of the larger bone with a better blood supply going on synchronously. However, we have other cases of non-regeneration of the tibia when it was the only bone resected. It has been the experience of other workers that the tibia is favorable for resection in that it has the adjacent fibula for a splint does not always regenerate probably because it is endowed with a relatively poor blood supply. The occasional failure of union in osteotomies of the lower end of the tibia is likewise usually attributed to the fact that the nutrient artery of the tibia extends proximally from its



Fig. 10 *a* Shows a woman who had been operated upon in early childhood for a complete congenital cleft of the lip and palate. There is a loss of the premaxillary bone and the lip is very thin, much scarred and bound down to the maxilla. The first step in the treatment was to liberate the lip base of columella and alar by incision and Thiersch graft as described in Figure 9. Next the whole outer surface of the lip was replaced with a flap from the forehead giving the result shown in Figure 10 *b*.

Fig. 10 *c* Shows tracings for comparison. Note how much the alar septolabial angle and the lip have been brought forward but the tip of the nose has been moved very little. The case could still be improved very materially by transplanting the columella forward in the septum with corresponding forward movement of the tip. The new lip is still thick from recent operation.



Fig. 11 *a* and *b* The retraction may be complicated by a very short mucous lining of the nasal fossa which will have to be lengthened before the tip of the nose can be brought forward. This was accomplished by piecing out the covering as well as the lining. After freeing the soft parts of the nose from the maxilla and nasal bones through a crescent incision across the bridge which completely divided the septum and the lining mucosa, the nose was drawn forward and the gap in the lining was pieced out by means of a forehead flap let in through the external incision. After this tissue had healed in place, the pedicle was cut and part of the remaining flap was used to lengthen the external surface of the nose.

Fig. 12 *a* In this case the soft parts were freed from the bones through an incision in the upper labial fornix and the cut mucous lining was pieced out by means of a flap from the arm let in through an incision in the upper fornix.



Fig. 12 *b* The final result obtained by this operation and the subsequent implantation of a rib cartilage into the dorsum.



Fig. 13 *c* The condition immediately after the first operation was completed and the pedicle of the flap returned to the arm.



Fig 9

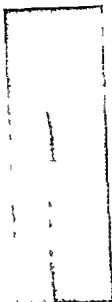


Fig 10

Fig 9. Case 8. Ten months after the resection and nine months after the fracture showing the width of the bone and the site of the fracture.

Fig 10. Case 8. Nine months after the fracture to show the thickness of the femur. Undoubtedly the fracture is due to the poor shape of the bone which may have been caused by allowing the patient to walk without other support than a cane at the much too short interval of 4 months after the resection. Nine months to a year is the usual interval allowed now.

the use of a brace was continued until 20 months after the fracture. Motion of the knee was good although slightly limited. Three years after the fracture the patient is walking with a cane with $\frac{3}{4}$ inch shortening and shows no signs of infection. The femur is regenerated firmly although somewhat broader and flatter than the original bone and the use of the cane is continued for greater security (Figs 9 and 10).

CASE 9. C. F. a white male entered the hospital at the age of 16 years having had incision and drainage operations upon the ulna and upper end of the right femur within the preceding year. He presented on admission two sinuses over the lateral portion of the right upper thigh, three over the outer end of the left clavicle and a healed scar over the lower end of the right ulna. The head and neck of the femur were thoroughly curetted and 9 months later the patient was walking without the aid of a cane, there being firm ankylosis of the hip with discharge from a small sinus. However the clavicle was still discharging and the bone was resected. A year after the operation on the femur the process in the ulna reawakened and the ulna was resected leaving a half inch below and an inch above. Healing and regeneration proceeded rapidly and two years later



Fig 11. Case 9. Two months after resection.

in November 1924 there were no discharging sinuses, the bones were all firm, there was but 1 inch shortening of the right leg and perfect function of right elbow and wrist (Fig 11).

CASE 10. J. P. a white female entered the hospital in May 1922 at the age of 16 years. In the fall of 1920 an abscess of the hip was opened and discharged for several months until the knee of the same leg became swollen, the latter condition improving considerably under the influence of baking. On admission the X-ray showed some roughening of the bone with periosteal thickening and there were signs of abscess in the lower outer portion of the thigh. There was a definite abscess cavity about the bone with a shell like portion of bone lying free but there were no sinuses leading into the bone. The wound almost healed and then broke down again following which resection of about 7 inches of the lower end of the femur was performed. Convalescence was stormy, the knee joint became infected but was cured by repeated aspiration of the purulent material. A month later a large abscess developed on the medial aspect of the thigh. After about a year firm union had occurred and the patient was walking with good motion of the knee but with $2\frac{1}{2}$ inches shortening. Eighteen months after the resection an abscess developed on the medial aspect of the thigh and when it was opened a small piece of bone was found. The wound promptly healed and the patient is at present entirely healed with good motion of



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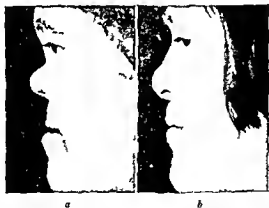


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Fig. 12 b The final result obtained by the operation and the subsequent implantation of a rib cartilage into the dorsum.



Fig. 12 c The condition immediately after the first operation was completed and the pedicle of the flap returned to the arm.

granulations which led up directly toward the epiphysis. This was curetted leaving an opening 1 inch deep and $\frac{3}{8}$ inch in diameter. Two rubber tubes were then inserted meeting in the center one coming out at each end through the periosteum. The periosteum was carefully sutured together over these tubes. The leg was placed in a Thomas splint and after 6 hours the wound was irrigated hourly with Dakin's solution through the tubes. There was a rather marked febrile and cardiac reaction but this subsided in 6 days. A series of X rays (Figs 13 a 13 b 13 c) showed rapid bone formation. Dakin's irrigations were continued for 1 month and then saline was substituted since the discharge had become less purulent and much less profuse. The tubes were loosened after about 2 weeks and were entirely removed at 5 weeks. Irrigation was then earned on with a syringe the periosteum being patent from one opening to the other. Not quite 2 months after the operation the patient complained for the first time of pain in the left humerus. She had no elevation of temperature. Examination showed very definite thickening of the mid portion of the bone. This had not been noticed before the operation although no X rays had been taken of the arm. The X ray now showed marked periosteitis with destruction area in the medullary substance of the bone. There is also slight eburnation. It was the opinion that this process antedated the resection of the tibia. Sauerization of this lesion was immediately performed with very little reaction. Both wounds healed very well although some small sequestra were extruded from the tibial wound. Six months later the discharge has ceased and while weight bearing has not been allowed the bone is very solid.

SUMMARY OF CASE REPORTS

The case reports include the resection of 1 long bones in 16 patients. Five patients had 2 resections each. There were 9 femora all but 1 of which (Case 14) have regenerated completely and firmly, 2 showing the maximum shortening of about 3 inches (Cases 1 and 9). The 1 case in which regeneration did not occur was in an adult male of 40 years in whom the age is undoubtedly the causative factor of the failure. However after about a year union is becoming much firmer and it seems as though he may still get a good functional result except for shortening.

There were 6 tibiae, 2 (Cases 4 and 10) have only partly regenerated, one possibly because the femur was resected at about the same time and 1 because the lower epiphysis was sacrificed (Case 10 luetic). One fractured at the end of 2 years with poor union but has be-



Fig 12 Case 15 a b Two and one half months after resection of 3 inches of shaft of femur. Sh. wing complete regeneration 11 months after resection. Patient has now less than 1/2 inch shortening.

come firm under the influence of immobilization (Case 6). Three have regenerated solidly although one has not yet been subjected to weight bearing.

There were 2 ulnae, 1 of which failed to regenerate possibly because the femur was resected at about the same time (Case 3). Of the 2 clavicles both have regenerated completely, as has the 1 fibula and 1 humerus.

In the first 13 of the cases or in other words the first 18 resections, 2 years or more have transpired since the operations and the results have more finality than the last 3, although osteomyelitis is a disease about which final results must be given cautiously. In every case but one (Case 14, the adult) there has been a decided improvement in the general health. We have personally examined within the past few months almost all of the cases reported and to the best of our knowledge there is only 1 discharging sinus (Case 14) in the series of 21 resections. Of the 21 resections there has been incomplete regeneration in 4 (19 per cent), fractures in 4 (19 per cent), recurrence of infection in 2 (10 per cent) of which 1 was merely an abscess about a small detached piece of bone healing occurring promptly without shaft involvement and the other was the appearance of infection in a bone other than the 2 which had been resected, probably having as the source a bone which



Fig 3



Fig 4

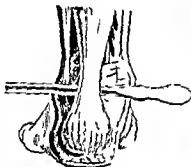


Fig 5



Fig 6

Fig 3 Lateral view

Fig 4 Same view as that in Figure 3 showing flattened arch in type of fracture with complete avulsion of posterior fragment

Fig 5 Anterior view showing position of metal instrument used to pull down on after tenotomy

Fig 6 Lateral view showing position of sound anterior to tendo achillis

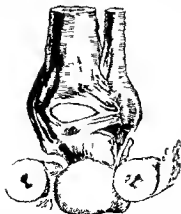


Fig Schematic drawing showing position of roller bandages used to protect soft parts when the amputation of the os calcis is being taken out

PROGNOSIS

There has always been considerable difference of opinion regarding the period of disability in fractures of the os calcis. We must consider the type of man and the work he does. The disability in these cases is not based on the statements of the patients but on the period covered by compensation and the actual date of return to work. This was secured from the compensation records.

Of the 9 cases operated on the shortest period of disability was 7 weeks the longest 19 weeks. Of the 6 cases not operated on the shortest period was 12 months. One case was that of an old luteal negro 63 years of age with a congenital flat foot. The other was a case of bilateral fracture one of which was severely comminuted and compound.

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the piston is drawn up the valve in the intake arm opens allowing fluid (blood) to be drawn up into the syringe and as the piston is pushed down the valve closes preventing the passage of fluid backward through the needle. As the piston is pushed down the valve in the exit arm opens and fluid (blood) is allowed to pass through the valve into the vein of the recipient and as the piston is drawn up the valve closes preventing blood being drawn back from the recipient.

REGULATING THE FLOW OF CITRATE SALINE SOLUTION

Place a suitable clamp (davispring pinchcock) on the rubber tube between the Y tube (burette) and the valve nearest to it. Screw down the Murphy clamp tight. Release the cut-off clamp. Unscrew the Murphy clamp until the solution comes from the needle in drops about 100 to the minute. Close the cut off clamp until you are ready. Take off the pinchcock and place it on the tube between the Y tube (burette) and the donor needle. The clamp could be placed here at first but in regulating the flow you would need to see that the syringe piston is not forced out by pressure of fluid so that you are given a wrong conception of the rate of flow.

TOURNIQUETS

Any suitable tourniquet may be used but I find that the old Army screw tourniquet with the

block removed is excellent. You can release it in a second without disturbing the arm, and in the case of the donor it can be loosened or re applied at will. I think it is a mistake to have your donor lying down too long before operation. Let him move around until the last minute and you will get a much better flow.

INSERTING THE NEEDLES

Insert the recipient needle first. Immediately loosen the tourniquet and release the cut off clamp on the burette tube. The liquid begins to flow through the apparatus into the recipient slowly but fast enough to keep the fluid in motion and gives no chance whatever for the formation of clot.

This bridges over that bane of direct transfusions that space of time sometimes short but unfortunately sometimes longer between the insertion of the recipient and donor needles. See that the syringe piston is kept pressed home at this stage as it may be forced out by the solution.

Insert the donor needle. Remove the pinchcock and proceed by steady easy strokes to pump the blood from the donor to the recipient. Count the strokes. By the simple deduction of the quantity of citrate saline solution from the total you will get the actual quantity of blood transfused.

Time and experience will decide which size of syringe is best to use with this apparatus whether a 30 cubic centimeter a 20, or a 10.

great effect as the incidence of failure seems to be scattered equally in the various age groups. One would expect poorer bone replacement in adults however.

With a somewhat more judicious selection of cases and some improvements in technique we believe that failure to completely regenerate should not occur in more than 10 per cent of all cases of resection. A cure of the infection should occur in practically every case after one operation. In cases of multiple chronic osteomyelitis some of the foci which one might term 'secondary' appear to be well localized. It is not necessary to resect the shaft to cure such a focus.

In the matter of technique of operation, the periosteum should be closed as completely as possible over a drainage tube of medium size.

It is probable that most of the bone formation is by the periosteum which may then deposit layer upon layer about the canal left by the drainage tube, the canal being left as a medullary cavity or filling in from the ends by callus formation to be subsequently restored to form a medullary cavity. The amount of the regenerated shaft formed by the endosteum is a matter of argument. It would seem to us that its rôle is slight.

Nichols' idea of sterilizing the cavity with carbolic and alcohol may be suitable in such cases as he reports in which the resection is done about 10 weeks after the acute process subsides and in which the periosteum is lined with a flexible shell of bone. However, to use such drastic antiseptics in the chronic cases would be to destroy the periosteal cells upon which success so much depends. Dakin's solution may be used until the discharge becomes glary and then replaced by salt solution while the tubes are gradually being withdrawn.

CONCLUSION

In properly selected cases of chronic osteomyelitis subperiosteal resection of the diaphysis of long bones, coupled with subsequent bone graft if necessary offers a better chance of cure and normal function than the less radical procedures.

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of Cancer Isolated is Claimed,' "Cancer Serum Seeming Cure," "New Era Opens to Science," "Description of Great Discovery Given" "Experiments for Inoculation and Immunization Are Declared Complete and Effective in Results' His complete overwhelming is achieved when deep down in the conglomerate mass of newspaper publicity he identifies in various parts of the country exclusive cancer serum agencies manned by highly reputable physicians

It has been the hope of the profession that a causative parasite of cancer might be discovered. Waves of enthusiasm have come and gone. Large sums of money have been expended in the effort. Many false alarms have been sounded. A great effort to isolate the parasite is now in progress. Several rival claims are in. Let us assume that the parasite has been discovered. How will it benefit the cancer patient? Immunizing vaccines and curative sera have been developed only in those self limiting diseases in which an attack immunizes against future attacks. The germ of tuberculosis was discovered more than 40 years ago. Tuberculin was developed. Yet it neither immunizes nor cures. The spirochete of syphilis was discovered more than 20 years ago. Yet no immunizing vaccine or curative serum has been found. Cancer is not self immunizing. Therefore an immunizing or curative cancer serum must be the product of a new principle in science. The discovery of a cancer parasite might lead to avoidance of the source of infection. It is possible that a diagnostic test might result. There is little reason to hope for more. The discovery would probably not materially change treatment.

We can now offer the cancer patient much encouragement without resort to speculation. Broders cytological classification founded on Macarty's study of the individual cancer cell, has done more to clarify the cancer ques-

tion for rational treatment than any contribution in recent years. By studying a large number of squamous cell cancerous growths with the corresponding histones and follow-up records and dividing them into four classes to be used as an index of malignancy, he found that in Class I, in which 25 per cent of the cells were embryonic and undifferentiated 91 per cent of good results were obtained in Class II with 50 per cent of embryonic cells 62 per cent of good results in Class III, with 75 per cent of embryonic cells 25 per cent of good results, in Class IV with 100 per cent of embryonic cells, 10 per cent of good results were obtained. The Mayo Clinic working on this basis has shown why certain cancers should be treated with radiotherapy while others do best with surgery. Radiotherapy destroys undifferentiated embryonic cells much more easily than normal cells.

In the average case of cancer of the cervix there is a large percentage of undifferentiated cells. Surrounding the cervix in close proximity are the ureters, bladder, and rectum. Cancer cells emanating from the cervix at a very early stage so distribute themselves near and around these organs that surgery which is both radical and safe is impossible. Radiation by destroying the embryonic cells before it injures normal mature cells takes precedence over surgery in these advanced cases of cancer of the cervix. Percy claims the same advantages for slow heat. In the more chronic forms of cancer so located that the growth and nearby lymphatics can be removed with ease such as cancer of the breast and gastro intestinal tract including the rectum surgery rightfully claims the field. For deep incurable malignancies and their lymphatic metastases for growths of the sarcomatous or lymphosarcomatous types and as a postoperative prophylactic treatment radiotherapy claims the field and acts through



FIG. 1. Gross specimen. Shows tumor anterior to sacrum, pedicle replacing the third sacral vertebra and firm attachment to the anterior aspect of the spinal cord.

chamber anterior and above the enteric opening of the neurenteric canal. This leaves a portion of gut wall back of the anus which is known as the postanal gut. Most of these vestiges atrophy but it is logical to believe that they may persist in part or entirely and at any time during life give rise to definite pathological problems.

Mallory (6) reviewed the embryology with reference to the closure of the neural tube. He studied 7 human embryos for vestiges of this event and reported clinical cases with pathological conditions in this region which he thought were best explained on this embryological basis. He found a residue of tissue that contained epithelial and neural elements in 6 of the 7 embryos examined. The pathological

tissue removed from the clinical cases showed cells of neural origin and neuroglia fibrils. He said nothing of the neurenteric canal or possible pathological conditions associated with the filum terminale. Middeldorpf (7) in a report of pathology found in this region reviewed the embryology in search of an explanation for tumors between the rectum and sacrum. He concluded that they were best explained as arising from remnants of the postanal gut. He did not mention the possibility that tumors found within the vertebral canal in the region of the cauda equina had a similar etiology. Borst (1) discussed the other theories postulated to explain the varied and complex pathology found here. They are all abstract, hard to comprehend and difficult

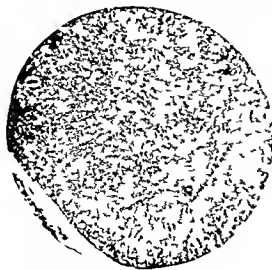


FIG. 2. Low power of pedicle. Shown tendency toward cord reduplication.

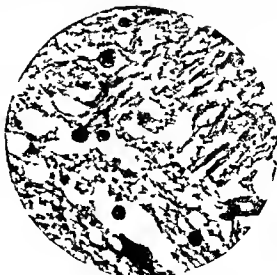


FIG. 3. Oil immersion (X800) showing glia cells and glia fibrils.

tiate the true and the spurious by remembering certain principles of ethics in science. He who reveals the cause and nature of cancer must be a true scientist. The scientist is a devotee of truth. He courts investigation and therefore submits his facts to his peers before submitting them to the public. When he publishes them he gives them to the scientific press before giving them to the lay press. In revealing great fundamental truths in medicine there has been no notable exception to this rule.

The scientific physician is an altruist. His mission is to save life, prevent disease, restore health. He never withholds from other members of his profession any remedy or agency that may be of value in the treatment or prevention of disease. He never arrogates to himself an exclusive or secret remedy for purposes of personal gain. The scientific physician would rather be a Pasteur in poverty than an Abrams in affluence.

R. C. COFFEY

ARTHROPLASTY

THE mobilization of ankylosed joints is one of the problems that confronts modern surgery. Here and there at odd times the subject has been brought forward for discussion. The rarity of ankylosis as compared with other lesions that the surgeon is called on to relieve, the somewhat exacting technique and the extremely important position that the long postoperative supervision assumes in the management of these cases have all been factors in the inexperience with arthroplasty of many otherwise experienced surgeons. The advancement of the specialties to their present position of increased surgical responsibility has caused just this type of case to gravitate naturally into the hands of the orthopedic surgeon and the reports now forth-

coming as a result of this segregation make possible a true perspective and place the proper value on arthroplasty. Large series of cases are reported wherein as high as 80 per cent of the results of arthroplasty are satisfactory. A symposium at the International Surgical Association in London in 1923 crystallized to a certain extent, our knowledge of the subject. The discussion brought out clearly that arthroplasty was considered by some of the members to include all operations which had as their object the establishment of motion in an ankylosed joint. Accordingly excisions were mentioned on equal terms with arthroplasty. The Italian and American participants in the symposium however contended that arthroplasty was considerably more than an excision. Arthroplasty has gradually developed and become standardized, the technique being modified according to the anatomic structure and the physiologic function of the joints. Prominent in such development have been the late J. B. Murphy, Putti, Baer, Campbell, MacAusland and others. In America arthroplasty is considered to be a refined excision, its object being not only to produce motion but to furnish stability and the operation is definitely planned and executed with these two objects in view.

The arthroplastic operations performed in the Mayo Clinic were reviewed recently and 103 of 142 patients were traced. The results of the operation were satisfactory in 81 per cent of cases, either excellent or good in 62 per cent and excellent in 38 per cent. The operations on the jaw gave the best results, the elbow the next best, the knee next and the hip the poorest. From the findings in this and other series certain fundamental principles can be deduced.

The destructive arthritis following the infection or trauma of a joint must be thoroughly quiescent and manifested by absence of

Age	Sex	Symptoms	Location	Intra dural	Extra dural	Attachment	Defect	Diagnosis
9	F	2 1/2 yrs	11 D 4 L	+	?	?	?	Gloma
16	M	3 yr	12 D 3 L		+	N	?	Teratoma
4	M	5 mos	2 S		+	A	?	Chroma
33	M	8 yr	12 S L	+		Co	?	Chroma
8	F	2 1/2 yr	12 S L	+		C n	?	Ependymoglioma
5	F	2 1/2 yrs	12 L 5	+		N	?	Ependymoglioma
27	M	3 yr	12 D 3	+		?	?	Ependymoglioma
4	M	8 yr	L 4th L	+		Co	?	Ependymoglioma
8	F	2 1/2 yrs	S 4 L	+		Co	?	Ependymoglioma
1	M	?	12 L 2 S	+		C	?	Ependymoglioma
47	M	3 yr	2 L	+		?	?	Adenoma
1	F	3 yr	C 4 da	+		?	?	Ependymoglioma
3 1/2	F	2 yrs	C 4	+		?	?	Nerve
4	M	6 yr	C 4 da	+		?	?	Common
7	?	3 yr	Cauda	+		?	?	Ependymoglioma

Each case reviewed however indicates that the tumor arose from the neurenteric canal. Hurler's (4) review of tumors between the rectum and sacrum is quite complete. He inclines toward the embryological explanation. The names applied to these tumors are confusing. Most of them are designated as teratomata but the names found for the remaining tumors form a lengthy list. Every tumor found even those spoken of by composite names such as chondromycolympha-denosarcoma might well have had their origin in a tissue residue of the neurenteric canal. Hurler noted that these tumors tended to invade the sacrum indicating that the growth infiltrated along the course of this structure. These facts indicate that the neurenteric canal is responsible for many abnormalities found along its course.

The behavior of these tumors is interesting. They remain quiescent for years and then frequently start to grow with rapidity. They may be encapsulated or invasive. Although they have histological appearances that permit of almost any diagnosis depending on rapidity of growth and type of tissue proliferation these tumors have not been known to metastasize. This recalls other tumors attributed to fetal residues as adamantinomatous odontomatous Rathke pouch tumors etc.

The tumors in the pelvis can be determined by rectal and proctoscopic examina-

tions. An anterior defect in the sacrum if present is demonstrable. Tumors of the cauda equina are harder to diagnose. Often patients go from physician to physician with no other trouble but pain in the lower extremities. Such a case unless explored may remain undiagnosed for 25 years. When rapid growth begins signs and symptoms are progressive according to the rapidity of growth. Surgery has given the best results. Many times the extent of the tumor cannot be made out before operation. It is at times impossible to remove the tumor intact. If this cannot be done the benign nature of the tumor permits piecemeal removal without the fear of soiling. These procedures have been followed by A. Gray and Radium with very indefinite results from this part of the treatment.

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MASTER SURGEONS OF AMERICA

JOHN COLLINS WARREN

JOHN COLLINS WARREN was born in Boston on August 1, 1778. His grandfather, Joseph, was a prosperous farmer settled in Roxbury. His father, Dr. John Warren, was the younger brother of Dr. Joseph Warren, the Revolutionary patriot who was killed at Bunker Hill. John Warren was one of the founders of the Harvard Medical School. Warren's mother, Abigail, was the daughter of John Collins, Governor of Rhode Island from 1786 to 1789.

Warren received a good education in the Boston Latin School, graduating with honors and being the first to receive the Franklin Medal. Entering Harvard College in 1793, he graduated in 1797 with a class of 54, having a part in the commencement exercises.

He was not strong in body and not much given to worldly pleasures but strong in will power and in resolution to make the most of his opportunities. His serious bent of mind seems to have been partly inherited and partly molded from his environment. His grandmother, a pious lady held in great esteem in her community, was still living. She had brought up a family, two of whom had been conspicuous examples of patriotism, his father John having also served in the Revolutionary Army as surgeon. Some of these qualities may also have been derived from Governor Collins, particularly those which enabled him in after life to rule with a stern hand.

At the time of his graduation he had formed no decision as to the future, nor does he appear to have been biased by any parental influence. He was the eldest child of a family of seventeen and the economic situation was probably a trying one. A mercantile career seemed the obvious solution of the difficulty but the call of medicine must have been in the blood for, at the close of a year's time, he entered the Harvard Medical School. After a year of study in this institution which was still in its infancy he decided to complete his medical education in Europe. Accordingly he embarked for London in June, 1799, and on his arrival made an arrangement with Mr. William Cooper, surgeon at Guy's Hospital, to be his dresser for a year for which he paid a fee of 50 guineas. As Mr. Cooper was the senior surgeon and made comparatively few hospital visits during the week, Warren had from the beginning almost complete control of his patients. Mr. Cooper was near the close of his professional life and before Warren left London



Fig 3 If the retraction is limited to the lip and lower part of the nose it is not practicable to correct it by the implantation of either bone or cartilage unless one is willing to chisel away the prominence of the bridge before inserting the implant

A young woman with a well developed nasal bridge in whom the retraction was limited to the tissues bordering the anterior nares. In this case as in the immediately preceding one the columella was very short the anterior portion of each ala recurving backward to join it. The mesial crus of the lower lateral cartilage appeared to extend into the substance of the upper lip. In this type of case much improvement can be obtained by stepping forward the cheeks upper lip and lower part of the nose. This is done by freeing the lip and ala with the adjacent parts of the cheeks from the maxilla through an incision in the upper fornix which extends from one first molar tooth to its opposite fellow this is continued up into the nose and forward along the lower border of the septum. The cheeks and lip can now be sutured in a forward position on the maxilla which will correct the retraction about the anterior nares and the columella can be stepped forward on the lower border of the septum which will give a forward tilt to the tip of the nose. The hemorrhage following the freeing of these tissues is quite sharp and we have controlled it by gauze packing and maybe 10 minutes of finger pressure before attempting to suture. Just before suturing a curved semicircular elevator is passed between the skin of the dorsum and the cartilaginous bony framework of the nose. In one case of this kind to give greater mobility the writer made a circumferential division of the lining skin of the vestibule which was followed by a structure. This subsequently required an intranasal skin graft for its relief.

Fig 3 a and c. A case which was treated in the manner described under Figure 3. In this particular instance a vertical wedge of tissue was removed from the under surface of the middle part of the lip which allowed the skin to fold forward to compensate for the shortness of the columella.

Fig 3 b. Tracings made from the negatives of photographs a and c show how much was accomplished. A photograph sent by the patient 1 year later shows no appreciable recurrence of the retraction.

B Those due to a loss of bony foundation of the lip nose or both from trauma or disease.

C Those in which the retraction has followed repair of a single or double congenital cleft of the lip and palate.



Fig 4 a b and c. The same type as that shown in Figure 3 but more pronounced. The same type of operation was used in both cases.

Fig 5 Superimposed tracings of a case similar to that shown in Figure 3. In this case two pieces each 3 centimeters long taken one from the 8th and one from the 9th right costal cartilage were inserted in a tract made just in front of the maxillary bone between the floor of the vestibule and the mucosa of the upper fornix an external incision was made on each side in the ala labial fold which was immediately sutured.

This was not considered sufficient improvement and the operation described under Figure 3 a and b was subsequently done in addition.

Among those of the first group the lack of maxillary prominence is most marked about the lower and lateral boundaries of the anterior nares and is accompanied by an anteroposterior shortening of the septum. The whole maxilla may be contracted in size but in many instances the palate and alveolar process are absolutely normal in size and in their relations to the mandible.

Heredity or the atavism will no doubt account for many of the cases that would fall in the first group. In some the mucous lining of the nasal passages is markedly shortened from before backward which has suggested the thought that possibly early inflammations and scarring of this mucosa from infantile snuffles or other infections may have had a causative influence.

Besides direct trauma and ulceration the injudicious use of radium was the cause in 1 case included in Group B.

Following a repair of a congenital cleft of the lip and palate there may be considerable retrac-



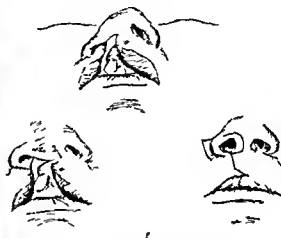


Fig 8 a b c d e f and g If a single harelip remains unoperated upon for some years or if the operation does not establish a proper relation between the base of the columella and the ala on the affected side then with growth there will develop a characteristic variation which consists

primarily of a unilateral retraction of the lip and nose and when pronounced can be satisfactorily relieved only by stepping forward the lip cheek and columella of the affected side. This necessitates the splitting of the columella in the midline and usually the removal of a V under the lip to allow one half the columella to be stepped forward.

Fig 8 d and b show the front and side views of such a case before and after operation and Figure 8 g shows the plan of the operation.

Fig 9 If there is much retraction of the anterior part of the maxilla the lip may have to be held forward either by orthodontic treatment or by a prosthesis. This shows the result of a previous correction after the loss of the anterior one-half of the palate and alveolar processes of the maxilla and part of the upper lip from trauma. The lip is adherent to the bone. The later treatment of the case consisted in first freeing the lip from the maxilla to allow the attachment of the ala and lining the new sulcus with Thiersch grafts. This required two operations. Later a full thickness triangular flap was turned from the lip into the upper lip at the site of the greatest loss.

Fig 9 b Shows the result of these operations before insertion of the prosthesis.



Fig 9 c Shows patient's appearance when wearing an upper dental plate which is so planned as to compensate for the lost part of the maxilla.

to bring the nose forward. In some cases the external nose was so small that it was necessary

to piece out the covering as well as the lining in order to obtain a desirable result.

In 1806 Warren was appointed adjunct professor of anatomy and surgery in Harvard University. He became prominent in the work of the Massachusetts Medical Society and in collaboration with his life long friend and colleague Dr James Jackson he edited the *Pharmacopæia* published by this society in 1808. Previous to 1811 no M D degree had been issued by Harvard but in 1819 Dr Warren received the distinction of an honorary M D degree from this University.

Dr James Jackson had been appointed professor of the theory and practice of medicine in the place of Dr Benjamin Waterhouse and Warren, at the time of the death of his father in 1815, became professor of anatomy and surgery. These two men set about to lay out a more comprehensive plan for medical education. Their appeal in a circular letter to the public in 1810 became a document of especial interest for in it there was called attention not only to the great benefits of a hospital to suffering humanity but to the important part which it played in the scheme for medical education. Their statement "A hospital is an institution absolutely essential to a medical school" probably marks the first formal effort to elaborate an organization so characteristic of modern methods. A new medical school building was completed in 1815 and the Massachusetts General Hospital was opened for patients in 1821. The tie that bound these institutions was not as close as would be thought necessary at the present time but it served its purpose fairly well at that early period. At the opening of this hospital Dr Warren was appointed visiting surgeon and Dr Jackson visiting physician. These two constituted practically the hospital staff for many years.

On the death of Caspar Wistar in 1818, the professorship of anatomy in the University of Pennsylvania was offered to Dr Warren and it may be interesting to mention in this connection that later on his return from Europe in 1838 he was offered the position of professor of anatomy and dean of the faculty in the University of New York. To both of these invitations he returned a decisive answer in the negative.

In 1812 the *New England Journal of Medicine and Surgery* was issued under the auspices of the medical school and this periodical was subsequently merged (1828) with the *Medical Intelligencer* to form the *Boston Medical and Surgical Journal* a weekly publication in operation ever since. Dr Warren became its first editor and numerous articles on medical subjects flowed from his pen. A treatise on Diseases of the Heart and one on Comparative Anatomy of the Nervous System were among his early writings.

Dr Warren brought back from Europe many novel ideas in the way of operative surgery among which may be mentioned the operations for aneurism and strangulated hernia the latter of which, he states, met with considerable opposition at first. He was one of the first to perform operations on the fissures of the hard and soft palates after the manner of Roux. His surgical practice became a commanding one as had been that of his father before him. He notes later (1852)



a

b



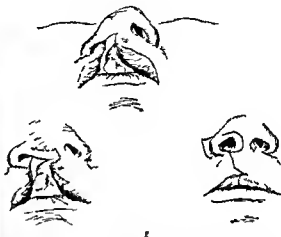
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e

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g

Fig. 8 a b c d e f and g If a single harelip remains unoperated upon for some years or if the operation does not establish a proper relation between the base of the columella and the ala on the affected side then with growth there will develop a characteristic variation which consists

primarily of a unilateral retraction of the lip and nose and when pronounced can be satisfactorily relieved only by stepping forward the lip, cheek, and columella of the affected side. This necessitates the plugging of the columella in the midline and usually the removal of a V under the lip to allow one half the columella to be stepped forward.

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a

b

c

Fig. 9 a c Shows patient's appearance when wearing an upper dental plate which is so planned as to compensate for the lost part of the maxilla.

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to piece out the covering as well as the lining in order to obtain a desirable result.

Anatomy He also left directions that, on his death, his body should be dissected and his skeleton prepared articulated, and hung in the Museum where it remains to this day. He had passed through the trying times which ultimately terminated in the passage of the Anatomy Act. Those who may feel inclined to criticize such a disposition of his body, have only to refer once more to the repulsive details of the trial of Burke and Hare¹ and the fate of some of those professors whom they served to look upon Dr Warren's judgment from a new point of view.

In 1849 the American Medical Association held its annual meeting in Boston and Dr Warren was elected president and delivered the annual address at the gathering in Cincinnati the following year. A pen picture of Dr Warren by a contemporary gives an interesting description of the personality of the man. 'His appearance was remarkable and such as to attract the attention of everyone who came in contact with him. His almost painfully thin yet upright form, his high forehead covered with scanty gray hair, his shaggy eyebrows shading his bright piercing eyes, the deep lines in his strongly marked face—all showed the man of iron will and cool fearless determination. Nor was this in any way disproved by the high, brusque authoritative tones of his voice when lecturing or about to engage in some operation. Here the wonderful steadiness of his hand, the unyielding unimpressionable character of his nervous system when interested in any detail of his profession showed one reason for his professional success.

Dr Warren was a man of deep religious turn of thought and a devoted member of St. Paul's Episcopal Church. For 30 years he was president of the Massachusetts Temperance Society and contributed largely of his means toward its success. Of his experience in this work he says 'On the whole I can with confidence say that if I had never tasted wine my life would have been more healthy and longer and more comfortable. The efforts which I have been called to make in the temperance reformation operating, as they have done more extensively on the prosperity and happiness of the community are a source of more satisfaction than any other labors. Probably my other occupations might have been as well or better performed by someone else but perhaps it would have been difficult to find another person who would have been willing to undergo the opposition, ridicule, labor, and expense in the cause of temperance.

Dr Warren's collection in the domain of comparative anatomy and of fossils remains gradually accumulated and, in 1846 when the bones of a mastodon were discovered in the State of New York, he purchased it and had a fireproof building constructed, in which to house the entire collection. He published an elaborate work on the bones of this mastodon. The skeleton at the present time is in the collection of the American Museum of Natural History in New York and is known as the Warren mastodon. At the time of his death he was president of the Boston Society of Natural History.

FRACTURES OF THE OS CALCIS¹

BY L. IRVING CONDIT M.D. F.A.C.S. DETROIT, MICHIGAN

THIS is a short review of 15 cases observed during a period of 24 months from January, 1922 to January, 1924 with the object of determining a definite period of disability.

Fractures of the os calcis are an unusual injury in a general practice. They are unusual in any form of employment except the building trades but comprise about 1 per cent of all fractures in this line of work.

These fractures are almost invariably caused by a fall or by landing on the feet. When there are no other fractures they are usually confined to falls of not over 10 feet. If the fall is greater they are complicated by fractures of the long bones above and severe injuries to the ankle joint itself.

The forms of fracture are varied. They may be and rather commonly are comminuted. There are 7 cases of this series that had more than one fracture line, 5 cases with one line and 3 compound cases, 1 of which was comminuted and 2 not. The axis of the posterior portion is lengthened laterally as a result of compression. The arch of the foot is disturbed and a flat foot results causing severe disability, particularly to the carpenter or laborer in whom this fracture commonly occurs.

The diagnosis should of course be made by X-ray but there are clinical signs that should always be looked for as follows:

First there is swelling and thickening posterior to the mediotarsal joint on both the internal and external surfaces. Second thickening occurs below the external malleolus. Third there is no disturbance in flexion or extension of the ankle joint but there is marked limitation of lateral motion that is pronation and supination. Fourth in taking the X-ray picture it is very important to get a projection through the bone from above downward to show the amount of disturbance in the lateral diameter.

TREATMENT

Nine of these cases were treated by open operation. The open operation in 5 of the 9 was a tenotomy (complete) of the tendo achillis. A small incision was then made directly above the posterior portion of the os calcis on both sides. A heavy round instrument was passed through above the bone and this portion brought down. This was done quite easily after the tendo achillis had been severed. In these 5 cases there was an avulsion of the posterior portion of the bone which had been pulled up by the tension of the tendo achillis.

The impaction which is almost invariable in all fractures of os calcis was then taken out by placing the posterior portion of the bone just under the malleolus over a sandbag and striking the other side with a heavy padded mallet. A roller bandage was placed on either side just under the malleoli as noted in the operation. This was done on both sides. In the other 4 cases it was necessary to make a larger incision and replace the fragments. In 2 cases chromic catgut was used to hold the fragments. Of the 6 cases not operated on 4 were treated by the sandbag and mallet method in the last 2 nothing being done but the usual immobilization. In all 9 cases the dressing was a pad or roller bandage on the arch with the foot in hyperextension and a plaster cast. The time of having the cast on varied somewhat but in the average case it was left on 3 weeks. It was then removed daily or every other day and passive and active motion begun. The cast was removed entirely in 5 to 6 weeks.

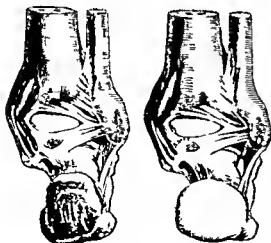


Fig. 1 (left) Normal outline of os calcis posterior view.
Fig. 2 Same view as that in Figure 1 showing flattened aspect.

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD JUNE 19 1925, DR CAREY CULBERTSON PRESIDING

SPECIMENS OF INTRALIGAMENTOUS FIBROIDS

DR J L BAER S A aged 49 was admitted to Michael Reese Hospital May 13 1925. She was married but had never been pregnant. Menstruation began at the age of 12 was irregular coming on every 4 or 5 weeks and lasting 1 day but was not painful. Artificial menopause occurred in 1909. For one month she had complained of a pain in the right lower quadrant of the abdomen accompanied by nausea and vomiting. This pain was aching in character and not severe.

On physical examination a hard symmetrical tumor was palpable above the pubes and toward the right side. This tumor was about the size of a 3 months pregnancy. Vaginal examination showed the cervix closed conical and hard the corpus retroflected and 50 per cent enlarged. Anterior to the uterus and to the right was a mass filling the right lateral fornix and extending abdominally from the midline at the level of the umbilicus into the right iliac fossa. The mass was soft movable nontender.

Operation performed May 15 1925 revealed a large soft mass the size of a fetal head lying between the layers of the right broad ligament. The uterus was the size of a fist and contained a submucous fibroid. The layers of the broad ligament were dissected off the mass isolated and removed with the uterus which was amputated subtotally at cervix.

The patient left the hospital in excellent condition on June 3 18 days after the operation.

The second patient Miss A A aged 23 was admitted to Michael Reese Hospital June 8 1925. She complained of abdominal pain dysmenorrhea and increase in the size of the abdomen. The symptoms had been present for 1 year. Menstruation began at 13 was regular 2 to 3 days in duration until 1 year ago when the flow became more profuse lasting 6 to 7 days with pain in the back. She had had abdominal pain dull aching in character localized in the right lower quadrant for the past year.

Physical examination was practically negative except for the abdominal and rectal findings. A large firm mass filling the entire abdomen was palpable. It was about the size of a full term pregnancy. On rectal examination the uterus was found to be acutely retroverted the pelvic inlet occupied by a mass extending upward filling the abdomen irregular in shape firm in consistency. The left and right round ligaments extended along its margins. At operation June 11 a very large fibroid was

found lying within the folds of both broad ligaments and removed. The uterus was normal and left *in situ*. The left ovary contained a small cyst which was also removed.

The patient was in the hospital at the time the case was reported but was doing nicely.

The small specimen is an intraligamentary fibroid which in the formalin has shrunk to about half its size. The other is a submucous intra uterine fibroid. The intraligamentary fibroid is practically continuous with the submucous intra uterine fibroid as if there were a perforation. The abdomen was about the size of a full term pregnancy. The tumor was very soft. I attempted to incise the abdomen below the umbilicus. I extended the incision somewhat and was able to evert the whole tumor. The fibroid on the back of the uterus was over the promontory. I was able to strip off the bladder entirely and the round ligaments tubes and ovaries and other attachments posteriorly with the fundus of the uterus and then examine the true pelvis. This intraligamentary fibroid was in the pelvis in the circular space back of the bladder and in front of the cervix close down to the rectum. I took it out with out detaching it and obliterated the space by a few sutures. All the genitalia were conserved. This case is interesting because the tumor spread into both broad ligaments.

TERATOID DERMOID

DR E W FISCHMAN The patient age 11 years came into the County Hospital on the fourth day of her illness. She was taken ill suddenly with nausea and vomiting which continued up to the time of admission to the hospital. She also had severe pain in the abdomen which started in the right side and persisted in that region. Her temperature was 104 degrees pulse 140 and leucocyte count 26 600. The urine was negative and the blood picture was normal except for the leucocytosis. Upon abdominal examination the abdomen was found to be distended and rigid particularly on the right side where there was some bulging. Upon rectal examination a mass could be made out in the right lower quadrant which was immobile. The preoperative diagnosis was acute appendicitis with abscess formation.

The abdomen was opened through a McBurney incision. The peritoneum was found to be markedly

A NEW BLOOD TRANSFUSION APPARATUS

BY DANIEL McLELLAN M.D. C.M. B.A. VANCOUVER B.C.

THE following is a description with illustration of an apparatus for the direct transfusion of blood with the introduction of citrate and saline solution into the blood stream as it passes through the apparatus and there are also a few points on its use.

An all glass 30 cubic centimeter syringe is attached by means of a suitable adapter and rubber tubing to the stem of a Y shaped glass tube. By means of rubber tubing the intake arm of the Y tube is connected with the donor needle the exit arm with the recipient needle.

On each side of and a short distance from the Y tube is placed a cone shaped glass valve the one on the donor side with the apex pointing toward the donor the one on the recipient side with the base facing the recipient.

At a point midway between the donor needle and the glass valve nearest the donor a second Y shaped glass tube is placed to the stem of which a rubber tube 20 inches long is attached the upper end connecting with a 300 cubic centimeter burette for citrate and saline solution. On this tube are placed a Murphy screw clamp by which the flow can be regulated down to a drop and a cut off clamp by which the flow can be completely cut off as desired.

The needles are 15 gauge preferably gold. A small particle of erosion in a needle is a focus for clot. Gold does not rust. The needles are attached direct to the rubber tubing. Every joint possible should be eliminated.

POSITION OF PATIENTS

This is important. Tables should be placed in the form of an L or L reversed or a T the recipient's table forming the foot of the L or the cross of the T. With the donor's arm slightly outward but in a general way parallel to his side and the recipient's arm stretched out at right angles to his own body the two arms are in the correct position for the insertion of the donor needle toward the finger tips and the recipient needle toward the heart.

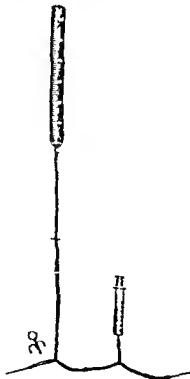
A standard with a goose neck attachment capable of being easily raised or lowered stands in the angle formed by the two tables and is out of the way of the small dressing table. From this goose neck hangs the burette.

The proportion of sodium citrate solution to normal saline is a matter which can be decided

by the operator. By using a mixture of 2 ounce of a 3 per cent solution of sodium citrate with 18 ounces of normal saline solution and allowing enough of this mixture to come through in drops it will be found that even less than one third the usual amount of citrate is necessary. In fact when smaller quantities of blood are being transferred say 6 to 10 ounces as in children once the first stroke of the syringe is made the citrate saline solution may be cut off altogether.

EXPPELLING AIR FROM THE APPARATUS

Clamp off the long tube. Fill the burette with warm citrate saline solution. Screw down the Murphy clamp to allow a moderate flow. Immerse the needles in a bowl of citrate saline solution. Release the cut off. A few strokes of the syringe will expel the air. The last bubble may be expelled by inverting the syringe. The automatic action of the valves may here be observed. As



From the comparative study of the graphs it appears that the type of suture plays an important rôle and that the strength of union of the incised uteri depend on the rate of growth of the connective tissue. We need not consider the smooth muscle (uterine) as it is doubtful whether smooth muscle regenerates.

DR MARK GOLDSTINE Rupture of the uterus may be obtained by increasing intra uterine pressure without a caesarean section. It does not make much difference what kind of suture material is used if endometrial tissue or infection is present in the scar rupture is apt to occur.

DR J L BAER If we knew the length of time between the operation and the subsequent rupture in other words what time interval was allowed for the scar to heal it might have a bearing on our estimate of the integrity of the scar.

DR DAVID S HILLIS The question of rupture of the uterus through a caesarean section scar is a very important problem at this time. The need for a correct solution is more urgent as the field for abdominal delivery becomes broader. Whenever we have a patient who has had a caesarean section and is pregnant again we always ask ourselves if this is to be another caesarean. We can never answer that question safely and properly before the patient tries labor. I do not suppose that the author believes that he has settled this question. If his work has contributed ever so little to our knowledge of this problem it has been worth while. I have opened many uteri that have had previous caesareans some of these I am sure would have held in a reasonably easy labor in others the scar would undoubtedly have ruptured under the strain. I do not know what is the best kind of a stitch to use in repairing the section wound whether interrupted or continuous it would seem that an absorbable suture material would be best but this question is not settled. Infection would be expected to have an unfavorable effect but I have seen very firm scars after a febrile puerperium.

DR J L BAER As Dr Hillis said when a patient who has had one caesarean operation becomes pregnant the second time it is a question as to what should be done. The case in point is one I had the privilege of presenting before the society some years ago. I did a caesarean section and immediately afterward the woman had a massive collapse of the lung.

The case was significant because the patient had a fibroid which was very big and blocked the passage. With involution the fibroid had shrunk down to the size of a fist. It was on the back wall and immediately after delivery the fibroid started at the promontory and the corpus was up to the umbilicus. I removed the fibroid by myomectomy. The uterus had a vertical incision anteriorly through the uterine wall and a vertical incision posteriorly that was two thirds through the uterine wall. The patient became pregnant recently and it had to be decided whether a section should be performed or if she should be allowed to go into spontaneous labor. I

let her come into the hospital and go into labor spontaneously. After 6 hours this practically primipara had brought the head down to the midplane. I did a manual rotation with simple extraction and fortunately the outcome was a happy one.

DA J I GREENHILL May I ask Dr Lackner whether he took into consideration the difference in the mechanics between contraction and overdistention of the uterus. I believe that all the uteri in Dr Lackner's experiments were ruptured by increasing the intra uterine pressure. As I understand it a uterus usually ruptures at the height of a contraction. We have a good example of this when after pituitrin is administered the rupture occurs at the height of a violent contraction or series of contractions. I wonder whether tracings were made to see if any of the uteri ruptured at the height of a contraction.

I was glad to hear Dr Hillis mention the lower uterine segment because there are perhaps only two authentic reports of a rupture of the lower uterine segment following a cervical caesarean section in which the entire incision was limited to the lower uterine segment. Did the authors have an opportunity to study scars in the lower uterine segment and to compare them with the scars in the fundus?

DR LACANZA (closing the discussion) I wish to say that this is only a preliminary report. There has been no previous work done in determining the amount of pressure needed to rupture the uterus. A great deal of our time has been given to the determination of the normal pressure required to rupture the uterus. The other factors have not been worked out at present.

Seven to 10 months have elapsed between the operation and rupture of the uterus. In reviewing the literature we found no report of a rupture of the lower uterine segment that was a true rupture. In each case in which reports of rupture were shown the rupture apparently was through the incision which was supposed to be a true low cervical caesarean section incision. However the incisions extended into the body of the uterus.

We have not been able to do caesarean section in the lower uterine segment on the goats. Nor do we wish to draw conclusions at the present in reference to the necessity of a second caesarean section. Only the tensile strength of uterine muscle is considered.

THE TEACHING AND PRACTICE OF OBSTETRICS

DR W GEORGE LEE read a paper on the teaching and practice of obstetrics (See p 74)

DISCUSSION

DR C S BACON Detailed analysis of the reports in the Cook County Hospital show that there is a great deal of difference in the practice of the different members of the obstetrical department. That is a fact of great importance. In our efforts to improve hospital practice it seems to me that it is necessary

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

FRANKLIN H. MARTIN, M.D.
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Managing Editor
Associate Editor

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Chief of Editorial Staff

JANUARY 1926

THE HARD LOT OF THE CANCER PATIENT

THE lot of the cancer patient receiving the best possible treatment that can be offered, is unenviable. The lot of the cancer patient who by neglecting treatment experiences the normal inevitably fatal and loathsome course of cancer is hard enough. The lot of the cancer patient who nearing his end of torture in sad retrospect learns that his disease could have been cured by relatively simple measures and that he has been deluded by false prophets and false theories until his case is hopeless and his family penniless is indeed pathetic.

Our problem as physicians is to make easier the lot of the cancer patient. The promulgation by accredited physicians of half-baked theories and pseudo scientific work adds to his difficulties.

The American Medical Association, the American College of Surgeons and the American Society for the Control of Cancer have done much to educate the public. This education forms a good psychological background but the individual who has cancer demands action. To discuss theories with the cancer

patient is to jest with him. The only question which seriously interests him is "What can be done for me?" When a patient is told by a responsible physician that he has cancer, he is dazed, terror-stricken and feels hopeless. Any chance for escape is seized upon. The more positive the promise of cure, the more enticing is the prospect. With avidity, he reads in metropolitan magazines the announcement of an electrical instrument by which its possessor can from one drop of blood discover and locate cancer and with a similar device can effect its cure. A fitting climax is reached when, during a meeting of the American Medical Association, he observes a picture of the originator (a regularly licensed physician) occupying a full page of a great newspaper and bearing the significant caption: "Our Most Distinguished Citizen."

Other front page newspaper articles quoting recognized medical authorities announce a new development by which X-rays are made to converge in the deeper parts of the body and destroy a deep cancer without injury to intervening or adjacent tissues. The inference is that surgery is needless, radium out of date, deep X-ray the final word. Again to the utter confusion of the cancer patient, his morning paper states that a great newspaper "will announce tomorrow" the details of the discovery of the germ of cancer along with a serum for immunization and cure. A few days later he reads in many daily papers the announcement that the scientist himself has read a paper at a medical meeting at which lawyers, newspapermen and others took part and the address was of a character to inspire in blazing headlines, such terms as "Germs

CORRESPONDENCE

ARTIFICIAL VAGINA THE
BALDWIN OPERATION

To the Editor Since the method of operation for absence of vagina by transplanting a loop of bowel was described by me more than 20 years ago¹ that operation has been performed on the whole in a relatively large number of cases though no attempt has ever been made to determine even the approximate number.

In the original description of the operation the statement was very positively made and has been repeated as opportunity offered subsequently that while the operation was a simple straightforward procedure it was not one for surgical tyro. Recently several writers particularly in Germany have claimed quite a large mortality for this operation and have contrasted it with the alleged absence of mortality from the Schubert operation by which the lower four inches of the rectum are mobilized and used for a vagina. As my operation as originally devised should have no larger mortality than would result from the resection of a piece of intestine in a healthy patient it seems very evident that the warnings to tyros has been disregarded and with the anticipated ill results.

So far as known no modification of the original operation has been suggested which in any respect has proved advantageous. If a single piece of bowel is used the resulting vagina is too small if the opening through the tissues is too small or if after the loop of bowel has been brought down and opened the two sides are not reasonably packed with gauze the resulting vagina will again be too small but if the directions originally given are strictly followed such a failure I think will be impossible. A few months ago I had the pleasure of seeing with Dr. Allen B. Kanavel a patient whom he was about to discharge after successfully making his first artificial vagina operation. He said that before operating he had made a careful study of all the methods suggested and so-called improvements in methods but had finally adopted the method as originally published.

One case has been reported to me in which at the end of what had seemed to be a perfect convalescence the transplanted bowel suddenly escaped from its environment and appeared on the dressings. In this instance the operator was a fine surgeon but he perhaps failed to see that there was an ample blood supply in the mesentery attached to the portion of bowel selected or possibly he made a too snug closure of the peritoneum around that mesentery and thus cut off the blood supply.

In my personal work I have had but one death and that I am confident would not have occurred had it not been that the patient and her husband were foreigners so that it was impossible to explain the necessary after treatment and no enemas or stomach lavage were permitted. The case presented no evidence of peritonitis or ileus and the usual postoperative treatment if permitted would almost certainly have given the usual favorable result.

The patients upon whom I have operated have all been private patients and I have heard from most of them and to the effect that everything is normal. There has been no case of more than normal moisture in the new vagina there has been no dyspareunia reported and no divorces.

Professor William T. Black² of the Memphis Medical College as a result of his investigations of the work of many hospitals and operators has found that the average mortality in hysterectomy for fibroids with removal of the cervix is 10 per cent while without removal of the cervix the mortality for the same operation is 5 per cent. As the mortality of such operations at the hands of competent surgeons should not exceed a per cent the conclusion necessarily follows that it is such operators as furnished the statistics secured by Professor Black that are responsible for the mortality of the vagina operation as reported by the German surgeons.

The Schubert operation has never appealed to me as it seemed to be entirely unsurgical and would almost certainly be attended with unsatisfactory results as relates to the rectum and would be a poor makeshift as to the vagina.

J. F. BALDWIN, M.D., F.A.C.S.
Columbus, Ohio

ONE THOUSAND OPERATIONS FOR GASTRIC
DUODENAL AND JEJUNAL ULCERS

THROUGH an error in preparing the manuscript for the article by Dr. Pauchet, Paris, France, published in the December 1925 issue, page 711, the mortality statistics under the heading "Gastric Ulcer" are incorrectly stated. This paragraph should read:

The immediate mortality was as follows: gastroenterostomy alone for duodenal ulcer 1.2 per cent; gastrectomy for duodenal ulcer 2.5 per cent; resection for gastric ulcer in proximal third of lesser curvature 0 per cent; resection for ulcer in the prepyloric portion or in the middle third of the lesser curvature 1.4 per cent. —THE EDITOR

irritation, producing dense fibrous connective tissue which cuts off nutrition from the cancer cell and encapsulates it. In surface cancers of low malignancy, diathermy possibly best exemplified by Wyeth's endotherm is the agent of choice.

The pathologist skilled by study and experience in immediate microscopic section diagnoses becomes a keystone. From the microscopic section he may prognosticate the future and also determine the best form of treatment in a given case. The surgeon with his knife makes possible the work of the pathologist and with his knife subsequently cures the great majority of curable cancers. Carpenters, plumbers and masons are all required in the building of a great structure. The engineer has the perspective and apportions the work to the various technicians. The trained surgeon is the engineer in the treatment of cancer.

According to W. J. Mayo when the cancer has not extended beyond the primary focus more than 72 per cent of patients are cured. If cancer cells have left the primary focus only 19 per cent are cured. As there seems little prospect of marked immediate improvement in the treatment of cancer except by earlier diagnosis our next great duty is to instruct the potential cancer patient in terms which he can understand so that he may more promptly seek relief. The following statement though incomplete seems adequate for the layman.

A cancer or malignant tumor is a growing mass of non functioning cells capable of growth and reproduction in the same form after transplantation to a distant organ or part of the body. This movement takes place through lymphatic vessels in which are placed filters—lymphatic glands. Beyond these filters the lymphatic vessels empty their contents into the blood stream. A cancer cell

originating from a growth in a given organ and having broken into a lymph vessel floats onward and is caught in a filter. Here it forms another cancer of the same type. Some of these cells break away, float on further and may be caught in still another filter. Finally, having passed the last filter, the cancer cell enters the blood stream which circulates in all parts of the body. At certain places such as in bones, the lungs, kidneys, liver, etc., the blood passes through small vessels where the large cancer cell is lodged and begins its growth and the formation of a new cancer out of reach of any form of treatment. A cancer, before a single cell has left its original location is curable by any destructive means whatsoever, including the knife, cautery, caustic or what not. If one cell has left the original growth and has become lodged in a distant filter, removal of the original growth alone does not cure. The cell in the filter soon forms a new cancer. This has usually occurred when the cancer has been discovered but if the filters—lymphatic glands—containing the cancer cells are removed with the primary growth the cancer is cured. If one cell has escaped through the last filter into the blood stream the case is hopeless. Therefore cancer becomes the greatest of emergencies for no one knows the day or the minute a cancer cell has reached or will reach the blood stream. It therefore naturally follows that the best treatment of cancer is accomplished by surgery based upon accurate anatomical knowledge and consists in the removal of the primary growth and also the lymphatic vessels and glands intervening between the growth and the entrance of the lymphatic vessels to the blood stream. When removal is not practical or is incomplete radiotherapy is the only remaining remedy.

In the days of publicity and commercialism it is well to be prepared to differen-



Waly filius abbas.



Liber totius medicine necessaria cō

tinens quem sapientissimus Waly filius abbas di
scipulus abimeber moysi filii setar edidi regis
inscripsit unde et regalis dispositionis nomē
assumpsit Et a septuaginta philosophis di
scipulo ex arabica lingua in latinā sa
tis ornatum reductus Necnon a
domino michele de capella ar
tiom et medicine doctore ses
cundis synonymis a multis
et diuersis autoribus
ideo collectis illu
strat summaque
diligētia im
pressus

1523



pain tenderness, swelling and local heat. Tuberculous joints must not be interfered with for fear of a flare up. From a purely technical viewpoint, means must be taken to prevent union of the newly made surfaces and in all except the jaw, interposition of a piece of tissue, preferably autogenous is necessary.

The technique varies with the type of joint to be reconstructed. In operating on the jaw owing to the structures of its joint mere excision gives excellent results. Excision is also satisfactory in the upper extremities but is less compatible with good function in the lower extremities, where the problem of weight bearing is concerned. This is the most probable explanation of the contention that excisions are comparable in their results to arthroplasty. The surfaces must be reconstructed by the removal of just enough bone to allow a range of motion that will be sufficient for the function of the joint and still maintain the maximal stability. Suitable postoperative splintage must be provided for both the upper and lower extremities but for the latter sufficient traction must be insti-

tuted to separate the new joint surfaces. Mobilization must be started as soon as the blood clot is organized. Active and passive motion must be gradually forced to the limit, and at the same time physiotherapy, consisting of light heat, massage, and exercise must be consistently carried out.

All surgeons emphasize the great necessity of the careful selection of patients who are to be subjected to arthroplasty. It must be considered first whether a movable joint will be more useful to the patient than the stiff one he already has, taking into account his occupation and his economic state, and second, the stability of the patient's nervous system and ability to stand pain must be determined. The patient's cooperation is necessary in order to carry out the after treatment, which takes considerable time and often results in soreness and pain. Nervous excitable unstable patients especially if they are intolerant of pain, are not good subjects for the operation. It is very evident that children should not be subjected to the operation.

MELVIN S. HENDERSON

REVIEWS OF NEW BOOKS IN SURGERY

STARTING with the premise that orthopedic text books leave the medical student with too much to dig at Sever in his *Textbook of Orthopedic Surgery*¹ proceeds to give in a straightforward simple exposition a description of the surgery of deformities and disabilities of the apparatus of locomotion. Consequently the book claims to be a modest volume for the student's handy reference. It is just that. While it may be a slight shock to the experienced reader to find scoliosis, school seating, painful and irritating hicks, and compression fractures of the vertebrae as embodied in a common chapter such correlation from the student's viewpoint is reasonably happy.

Well chosen illustrations including excellent roentgenograms add to the clearness of the author's ideas. The reviewer recommends this small volume to all students and to those practitioners dealing with orthopedic problems. **KELLOGG SPEED**

THE beautifully illustrated book by Sheehan² describes in detail the correction of the various deformities of the nose. The technical procedures are carefully described and the various steps of the different procedures are clearly and adequately illustrated.

The treatment of two types of deformity—disface and complete or nearly complete loss of the nose—one might wish to have discussed in more detail. In the correction of the former only the implantation of a group of cartilage implants is considered. Blair's article on page 128 of this issue of *SURGERY, GYNECOLOGY AND OBSTETRICS* indicates both the importance of retraction of the upper lip and the variety of methods that may be used in its correction. From the description of operative procedures for the restoration of extensive defects the reader finds it difficult to form an accurate conception of a complete rhinoplasty.

The absence of any illustrations in the book showing the results obtained by the operative procedures described seems to us an unfortunate omission.

SUMNER L. KOCH

FACIAL Surgery by Pickenil³ a book of 150 pages is a concisely written and well illustrated record of the author's experience in this branch of surgery. Part 1 of 24 pages is devoted to principles

and technique. Part 2 to military surgery and Part 3 to facial surgery in civil practice. The last part includes sections on benign and malignant tumors, syphilis, furunculi, burns, harelip and cleft palate, facial paralysis and ankylosis of the jaw. Many of the latter are brief; the section on facial paralysis, for example, consists of a brief description of the technique of muscle transplantation, but they contain many helpful suggestions that will appeal particularly to the surgeon who has encountered some of the difficulties and problems of facial surgery.

The section devoted to the discussion of harelip and cleft palate lacks somewhat in clearness by reason of its brevity. The illustrations portraying the results of operations for harelip show the excellent results the author has succeeded in attaining.

Two types of cases described by the author are particularly interesting: persistent edema of the lower eyelid successfully treated by the subcutaneous implantation of threads of bipped silk to favor lymphatic drainage; and paralysis of the oblique oculi and iris due to injury of the seventh nerve corrected by transplantation of flaps from the temporal and masseter muscles. **SUMNER L. KOCH**

THE volume by Stewart⁴ on skull fractures consists of eighty-three roentgen ray studies which illustrate various fractures of the skull and those conditions which are commonly mistaken for skull fractures. These plates are accompanied by a brief description of the case history of the patient. They forcibly illustrate the absolute necessity for making an X-ray study of the skull in every case of trauma to the head.

Any one who has listened to the testimony of doctors upon X-ray pictures of the skull given before industrial compensation commissions could not refrain from wishing this book into the hands of each member of the industrial commission who arbitrates cases of injury involving injuries to the head. He might find it extremely helpful when good doctors disagree as to whether or not a normal blood vessel marking is a skull fracture. The dispositions of the skilled roentgenologist who is called upon to testify in such cases would certainly be preserved.

It is unfortunate that the reader cannot see the stereoscopic view of the plates shown in the text. Such a view adds a great deal to the ordinary flat plate. This volume is a distinct addition to the monographic atlases on roentgenographic subjects published by the *Annals of Roentgenology*.

LOYAL DAVIS

SKELETONAL FRACTURES Roentgenologic By C. S. Underhill. By William H. Sauer. 1931. New York: P. H. Hoeber, Inc. 95

TEXTBOOK OF ORTHOPEDIC SURGERY By J. E. Sever. 1931. New York: The Macmillan Company. 105

PLASTIC SURGERY OF THE NOSE By J. E. Sheehan, M.D. F.A.C.S. 1931. New York: P. H. Hoeber, Inc. 105

FACIAL SURGERY By H. P. Pickenil, M.D. F.A.C.S. 1931. New York: P. H. Hoeber, Inc. 150

SKULL FRACTURES By Stewart. 1931. New York: P. H. Hoeber, Inc. 95



JOHN COLLINS WARREN
1778-1856

AMERICAN COLLEGE OF SURGEONS

THE 1925 SESSION OF THE CLINICAL CONGRESS

THE fifteenth Clinical Congress of the American College of Surgeons met in Philadelphia beginning Monday, October 26 and ending Friday, October 30, 1925. Those who were responsible for its organization, both locally and generally, are to be congratulated upon the remarkable success of this meeting.

MONDAY, OCTOBER 26

The first session convened on Monday morning in the ballroom of the Bellevue Stratford with the president, Dr. Charles H. Mayo of Rochester, in the chair. It was a hospital conference and besides the number of interesting addresses by outstanding authorities in the hospital field, the list of approved hospitals in the United States and Canada was presented by the Director General. The meeting was continued throughout the afternoon.

At 8 o'clock on Monday evening the ballroom was crowded to capacity for the formal opening of the Congress. Dr. Charles F. Nassau, chairman of the local committee on arrangements, welcomed the Congress to the city of Philadelphia. His address is given in full in pages immediately following this article.

This was followed by the address of the retiring president, Dr. Charles H. Mayo, the induction of the new president, Dr. Rudolph Matas of New Orleans, the address of the incoming president, and the John B. Murphy Oration in Surgery by Sir William Arbuthnot Lane, Bart. of London, England. These addresses all so interesting and so thoroughly appreciated are being published in detail in *SURGERY, GYNECOLOGY AND OBSTETRICS*. At the close of this meeting a moving picture film was shown illustrating the original work of Dr. Matas on Surgery of the Blood Vessels.

TUESDAY, OCTOBER 27

Those particularly interested in hospital matters were again gathered in a conference at the Bellevue Stratford on Tuesday morning and afternoon. The clinics opened at the various hospitals with a full attendance everywhere. On Tuesday at noon the distinguished guests and officials of the College were received at the City Hall

by His Honor The Mayor of Philadelphia. The evening session in the ballroom of the Bellevue Stratford began promptly at 8 o'clock with a chalk and lantern demonstration by Dr. Chevalier Jackson of Philadelphia.¹ He was followed by Dr. A. Murat Willis of Richmond, Virginia, who spoke on 'The Mortality in Important Surgical Diseases Especially Appendicitis' with discussions by Dr. Damon B. Pfeiffer and Dr. John Stewart Rodman of Philadelphia. Professor Vittorio Putti of Bologna, Italy, was greeted with a splendid ovation when he arose to speak on 'Congenital Dislocation of the Hip'. His paper was discussed by Dr. Arthur Bruce Gill and Dr. DeForest Willard of Philadelphia. Dr. Putti's motion picture film showing the results of his treatment was an able demonstration of his remarkable work.

WEDNESDAY, OCTOBER 28

The hospital conference on Wednesday, in charge of the internists, was an excellent meeting and gave definite proof of the fact that Hospital Standardization is not alone for the surgeon but as well for those in other fields of professional practice.

Special sessions for the section on eye, ear, nose and throat were held in the ballroom on Wednesday, Thursday and Friday with interesting clinical demonstrations and papers. This first meeting of the session was opened by Dr. Philip Franklin of London, England, who exhibited a number of original slides of the Onodi Collection of Nasal Sinuses. During the week clinics in eye, ear, nose and throat work were conducted at the various hospitals in Philadelphia.

On Wednesday afternoon the University of Pennsylvania by special convocation conferred honorary degrees upon Lord Dawson of Penn. England, Dr. Charles H. Mayo of Rochester, Minnesota, and Dr. Rudolph Matas of New Orleans, Louisiana. Another special feature of Wednesday's program was the outstanding clinic of Dr. J. Chalmers Da Costa, conducted at the Jefferson Hospital. This clinic was attended by a

¹This and other fifth principal papers read at the Clinical Congress will be published in *SURGERY, GYNECOLOGY AND OBSTETRICS*.

was succeeded by his nephew, Astley Cooper, and there was then formed between the pupil and his distinguished teacher a friendship that lasted throughout life. In London were great opportunities for study at the clinics of Cline in surgery of Haighton in midwifery, of Abernethy at St Bartholomew's, and at St George's under Sir Everard Home, he was enabled to get almost at first hand the teaching of the new science of surgical pathology so recently inaugurated by Hunter.

A European medical education would have hardly been complete at this period without a visit to the Royal Infirmary in Edinburgh, where he passed the following academic year. The faculty of this school contained names still remembered as leaders in medical thought at that time such as Munro in anatomy, John and Charles Bell in surgery, Hope in chemistry, and Gregory in medicine. Warren also became a member of the Royal Physical Society of Edinburgh, which brought the students and teachers into close contact for discussion and study.

In June 1801, Warren left Edinburgh for Paris and passed the following winter in the household of Dubois, one of Napoleon's distinguished surgeons. This enabled him to meet many of the prominent teachers of that day. His clinical studies were conducted chiefly at La Charité. His chief pursuits were chemistry under Vauquelin and anatomy under Ribes, Chaussier, Roux, and Dupuytren. Bichat was one of the great lights of this period which was a brilliant one in medicine. These with daily visits to the hospital occupied him somewhat more than 12 months. He notes that the French students with whom he was thrown were green from the Revolution and were for the most part a rude and vulgar set. Many hours were spent at the Jardin des Plantes where he acquired a taste for natural history that became conspicuous in later years.

At the end of the following summer he went to London and sailed for New York, arriving there in the autumn of 1802. He brought home with him the degree of M.D. from St Andrews. On his return he was immediately plunged into a large practice owing in part to the ill health of his father who had been for many years the leading practitioner of Boston. Warren records the fact that in the following summer when he had entire charge of his father's work, he made some 30 visits a day. During the next winter, he acted as prosecutor to his father for anatomical lectures at Cambridge.

In 1803 he married Susan Powell, daughter of Hon. Jonathan Mason, a prominent merchant of Boston, and in 1803 he occupied a house on Park Street in which he resided for the remainder of his life. It was a roomy mansion, situated in the center of the residential quarter of a town which preserved strongly the earmarks of its English origin. The medical school was still in Cambridge and the apprentice system seems to have not yet been wholly abandoned. The Park Street house provided space not only for a class of medical students to foregather in a room with its sanded floor but for a certain period found room to accommodate a dispensary service.

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This is either the tenth or eleventh time that the Clin. C. Congress will be published in SURGERY GYNECOLOGY AND OBSTETRICS

that "the operations of lithotomy in Boston within the last sixty years have been performed by my father, myself or my son' (Mason Warren) His position as editor fitted him well to record in writing a vast amount of surgical experience covering this long period His most important publication was a book in 1837 "Surgical Observations on Tumors, which received a great deal of attention in this country and in Europe, and was translated into the German language It is evident also that he had the intention of writing a book on "Clinical Surgery " The manuscript for this work which had accumulated in great quantity but was never published, covers a most interesting period of surgical practice during the early part of the century A few examples will suffice to illustrate this point An operation for the removal of a loose cartilage from the knee joint is given in detail the patient after slight suppuration and some fever, attaining full convalescence and a satisfactory result Several cases of dislocation of the hip joint are given and we find here not only the old time method of reduction by pulleys but a detailed statement of the method of reduction by taxis such as was described by Bigelow and others a quarter of a century later The reduction of a dislocation of a shoulder joint is effected by a method corresponding accurately to that now known as Kocher's Method

After some 30 years of active work Dr Warren turned his practice over to his son and made a trip through Europe with his family He renewed his acquaintance with Sir Astley Cooper and revisited the scenes of his study in Edinburgh, seeing there Sir Charles Bell In Paris, he met Louis for the first time and obtained from Civiale the details of his new operation for lithotomy—which he was instrumental in introducing into this country on his return

Mrs Warren died in 1841 and two years later he married Anne Winthrop After her death in 1851 he made another European visit, receiving great hospitality from political as well as professional friends It was during this journey that he met Brodie and Clarke in London, and Velpeau in Paris Although this trip was undertaken in search of health the benefit proved only temporary and he was unable on his return, to go back to full active professional life but did devote much time and labor to scientific and literary work and was fully occupied in these pursuits almost to the date of his death

Dr Warren was elected a corresponding member of the Royal Academy in Paris as well as of the Medical Society of Florence an honorary member of the Medical and Chirurgical Society of London and he also belonged to the American Philosophical Society of Philadelphia and to numerous other medical and scientific organizations both in this country and abroad

In 1846 the medical school which by this time had outgrown its building was removed to a new site nearer the hospital Dr Warren took this opportunity to present his collection of anatomical specimens to the University, accompanied by a suitable endowment and it has since been known as the Warren Museum of

leaders, politicians, law givers, statesmen and others, nursed in the bosom of medicine have led in the vanguard of progress. But of all the manifestations of versatility and genius which have been exhibited by medically trained men, few can surpass in their immediate and direct value to the profession, the men who, endowed by nature with great vision, directing and administrative faculties, have put these to the profit of humanity through the instrumentality of medicine. These are the medical statesmen, unfortunately too rare among us, who combine a thorough and deep knowledge of their profession with a genius for political organization and governmental leadership. These men, with opportunities and temptations to transfer their intelligence and special talents to the more glittering field of politics with its more decorative and power giving rewards, choose to remain loyal and steadfast to their own profession while serving the highest interests of their profession and of the state in the realms of government. Medicine owes a great debt of gratitude to such leaders, and no honor that we can bestow is too great to express our appreciation of the service they render toward the advancement of our profession.

Today the opportunity has come to us to demonstrate our admiration of a member of our profession who, while serving the interests of his medical brethren in his own country, England, has set an example that will surely profit us as it has his own people. He, though one of the busiest and most responsible medical consultants in his own country, has found time and energy to serve the collective interests of his profession as its spokesman and representative in the councils of his government. His ability and efficiency in this eminent capacity have given him celebrity as an inspiring medical statesman and leader which has

spread far beyond the boundaries of his own country. No one who is at all interested in the changes that are going on in medical education and medical practice in his country, as in ours, can fail to appreciate the great breadth of vision and firm grasp with which he has recently handled some of the most difficult problems of state medicine. His mastery of these is only equaled by his capacity to illuminate many of the obscure clinical and pathological problems of everyday medical practice.

In his dual capacity as physician to the social body and healer of corporeal ills, Lord Dawson has proved himself not only the accomplished physician, keen and learned in his profession, but a contributor of extraordinary worth to its progress and welfare as a social collectivity. Further more, by his acceptance of our honorary Fellowship, he has symbolized the inseparable relations that bind the physician and the surgeon, and he has testified to that unity of purpose that fuses the diversified activities of these into a mutual service for the common good.

A nobleman by title and royal prerogative, he is a peer among Lords by the higher gifts that God gave him, and by the nobility that is his through the love and admiration of his Fellows, and this splendid doctor-statesman is the Rt. Honorable Lord Dawson of Penn. M.D., whom I have the honor to present to you.

The ceremony was closed with an enthusiastic, interesting and instructive presentation of the ideals of modern surgery by the president, whereupon the new Fellows and their friends were received by the president, the Board of Regents and distinguished guests. The Clinical Congress of 1925 left everyone with pleasant memories of an exceedingly profitable and entertaining week in the city of Philadelphia.

ADDRESS OF WELCOME

BY CHARLES F. NASSAU, M.D., F.A.C.S., PHILADELPHIA

Chairman, Committee of Arrangements

MR. PRESIDENT and Fellows of the American College of Surgeons. As chairman of your local committee on arrangements, it affords me the very greatest pleasure to extend to you on behalf of my colleagues and myself, and on behalf of the medical profession of Philadelphia and its institutions, a cordial welcome to this

city, the assurance of sincere hospitality, and an attractive program which has been arranged for our fifteenth annual Congress. We trust that you may reciprocate the cordial goodwill of Philadelphia medical men, and your participation in this Congress stimulating and instructive, and that you will depart from this community, having

But the crowning event of Dr Warren's career was the part that he played in the introduction of surgical anæsthesia. On October 16, 1846, he performed a major operation at the Massachusetts General Hospital while the patient was under the influence of ether administered by Dr William T G Morton. The experiment was so successful that it was used in other operations on the following days. This experience showed that ether as an anæsthetic agent was "safe, certain, and complete" —a triple feat which announced to the world that what had been dreamed of for many years had become a reality. In the obituary address at the time of the death of Dr Warren on May 4, 1856, Dr Oliver Wendell Holmes made the following reference to this historic episode: "He had reached the age when men have long ceased to be called on for military duty, when those who have labored during their days of strength are expected to repose, and when the mind is thought to have lost its aptitude for innovating knowledge, and to live on its accumulated stores; yet nothing could surpass the eagerness with which he watched and assisted in the development of the newly discovered powers of etherization. It is much for any name to be associated with the triumphs of that beneficent discovery, but when we remember the reproach cast upon Harvey's contemporaries that none of them past middle age would accept his new doctrine of the circulation, we confess it to have been a noble sight when an old man was found among the foremost to proclaim the great fact—strangely unwelcome, as well as improbable, to some who should have been foremost to accept it—that pain was no longer the master, but the servant of the body."

J COLLINS WARREN

macology Weir Mitchell celebrated both in letters and medical science Joseph Leidy, whose renown as a great naturalist and comparative anatomist spanned the ocean and gave lustre to his native city and to American science Jacob M. DaCosta the greatest medical clinician and teacher of his time But I cease to mention by name although there are many others

Not only was the first medical school in America established here but also the first medical college devoted to the education of women and to the exposition of the principles of homeopathy Jefferson Medical College has just completed one hundred years of honorable service and this year enters upon its second century

This city has educated and given to the service of the country and of the world not less than 42,000 physicians Until 1810 Philadelphia was the largest city in the United States, and had been the most important from a financial commercial,

political artistic, and scientific standpoint. In 1810 there were but five medical schools in America, with a total student body of 650 students and 100 graduates Two-thirds of these students were being educated in Philadelphia

The foregoing briefly and inadequately presents some of the historical background of Philadelphia and American medicine

You will have the opportunity to visit the institutions to which I have made brief reference, and you will be received by the successors of some of those to whose achievements I have paid small tribute You will I believe find them worthy upholding the traditions of our medical forefathers in institutions which better than ever before further their objects and purposes

Again I extend to you a welcome on behalf of the medical profession of Philadelphia, and wish for you the fulfillment of those expectations which have brought you to this shrine of American medicine

edematous and in places hemorrhagic. When the peritoneal cavity was opened a small amount of bloody fluid escaped and the great omentum was markedly infiltrated and adherent to a mass. When the omentum was pulled away this mass was found which appeared to be an ovarian cyst. Upon looking further it was evident that the mass originated from the left ovary and found its way to the right side. The pedicle was twisted three times and the fallopian tube on the left side took part in the rotation as did also the uterus so that the latter organ was pretty well thinned out and elongated. The tumor was removed and found to be a cystic mass filled with a large quantity of bloody fluid and sebaceous material. In one part there was a rather solid mass which contained a great deal of hair and two teeth. Upon microscopic section considerable cartilaginous tissue, bone, smooth muscle fibers and bronchiogenic tissue was found. It was considered a teratoid dermoid. The specimen is presented because it rarely occurs before the onset of menstruation and also because it was a combination of teratoma and dermoid and was pedunculated and twisted upon its pedicle three times.

AN EXPERIMENTAL STUDY OF RUPTURE OF THE UTERUS

DR JULIUS E. LACKNER discussed his experimental work on rupture of the uterus (See p. 69)

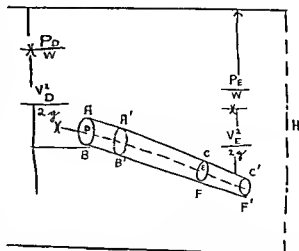
DISCUSSION

DR SIMON SCHUCHET I am most interested for the present in the hydraulics of this experimental work and shall attempt to explain only the principles of the determination and corrections of the pressure curves. An understanding of Bernoulli's theorem is required and I shall try to explain it in as simple way as possible.

The theorem of Bernoulli. In a steady moving stream of an incompressible fluid in which the particles of fluid are moving in stream lines and there is no loss by friction or other causes the pressure is constant for all sections of the stream and is represented by the formula explained in

$$\frac{P}{w} + \frac{v^2}{2g} + z$$

Let DE (Fig. 1) be the path of a particle of the fluid. Imagine a small tube to be surrounding DE and let the flow in this be steady and let the sectional area of the tube be so small that the velocity through any section normal to DE is uniform. Then the amount of fluid that flows in at D through the area AB equals the amount that flows out at E through the area CF. Let P and V and v be the pressure and velocities at D and E respectively and A and a the corresponding areas of the tube. Let Z be the height of D above some datum and Z the height of F. Then if a very small quantity of fluid



ABA'B' equal to quarters at D and a similar quantity CFC'F leaves at E in a time t the velocity at D is

$$v_D = \frac{q}{At}$$

and the velocity at E is

$$v_E = \frac{q}{At}$$

Since the flow in the tube is steady the kinetic energy of the portion ABCF does not alter and therefore the increase of the kinetic energy of the quantity q

$$= \frac{Wq}{2g} (v_E^2 - v_D^2)$$

The work done by gravity is the same as ABA'B' and therefore

$$= Wq(Z - Z')$$

and the work done by the pressure at E in time t

$$= P_E avt = -P_E q$$

but the kinetic energy must equal the work done and therefore

$$\frac{Wq}{2g} (v_E^2 - v_D^2) = Wq(Z - Z') + P_D q - P_E q$$

from which

$$\frac{v_E^2}{2g} + \frac{P_E}{W} + Z = \frac{v_D^2}{2g} + \frac{P_D}{W} + Z \text{ constant}$$

From this theorem it is seen that a vertical ordinate equal to the velocity head plus the pressure head erected the upper extremities of these ordinates will be in the same horizontal plane at a height H equal to

$$\frac{P}{W} + \frac{v^2}{2g} + Z \text{ above the datum level}$$

I trust that I have been able to convey the interpretation of this theorem so you may understand how we arrived at our corrections when we considered the frictions of the tubes etc.

research worker food for much reflection and speculation. Fortunately such sequelae are comparatively infrequent when a skillful operation has been performed under proper circumstances. Besides progress is being made in our knowledge of the causes, prevention and cure of recurrent lesions.

IMPORTANCE OF CAREFUL EXAMINATION

The chief cause of poor surgical results is the incomplete examination. There is a growing tendency to rely mainly on the results of a roentgenologic examination and to skimp or ignore the case history and gastric analysis. In the hands of the expert radiologist such procedure may reduce erroneous diagnoses and ill advised treatment to a minimum, but the results of less skillful radiography may be highly unfavorable to both patient and surgeon. The operation based on an erroneous interpretation of the radiologic examination of the stomach is a potential factor for mischief. This error might be avoided by a careful marshalling of all the facts.

The high incidence of associated lesions of the accessory digestive tract in cases of peptic ulcer makes routine inquiry for evidence of disease in the appendix, gall bladder and pancreas essential for an incomplete operation is not an infrequent cause of incomplete cure. The results of gastric analysis are important from both a diagnostic and a surgical standpoint. Exclusive of gastric retention, one of the most important disclosures of the test meal is achlorhydria or achylia. If present on a second examination by a fractional meal this secretory abnormality may connote various possibilities. The syndrome of ulcer may be simulated by so called achylia gastrica and I know of several such cases in which gastroenterostomy was performed by competent surgeons with no relief or even with the addition of more disturbing symptoms. Anacidity in the presence of roentgenologic deformity characteristic of ulcer of the stomach or duodenum may postulate (1) an inactive healed malignant or syphilitic lesion () the association of one or various diseases ranging from chronic cholecystic disease to pernicious anemia or (3) an asthenic neurotic state coupled with a hypotonic or dilated stomach.

While surgical interference is imperative when the possibility of malignancy of a gastric ulcer arises when a duodenal ulcer is of the hemorrhagic or perforative type or when there is evidence of associated disease of the gall bladder or appendix, the secretory status would call for some procedure other than gastroenterostomy. Excision with or without pyloroplasty, is to be preferred. It has been found necessary on several occasions to administer hydrochloric acid after gastroenterostomy performed for duodenal ulcer on account of persistent primary subacidity. The mimicry of ulcer by other conditions, functional and organic, the coincidence of other diseases and the fact that intrinsic gastric lesions constitute only a small percentage of the causes of dyspepsia make a complete clinical study imperative.

CASES SUITABLE FOR OPERATION

The surgical prognosis for the neurotic, asthenic, mentally or constitutionally inferior ulcer bearing patient is often poor, especially if the symptoms of ulcer are not characteristic or are not in the foreground. My experience with the medical management of these patients has made me more sympathetic with the surgeon in his dealing with these post-operative complaints. Conservatism or a guarded prognosis in the event of an operation should be the rule. The young patient with a short, uncomplicated history is usually not a good subject for operation and if his co-operation can be secured a course of careful medical treatment should first be tried. The small gastric ulcer of short duration without retention lends itself well to a course of medical treatment although the possibility of malignancy in elderly patients must always be borne in mind. While it may be a commentary on our shortcomings in diagnosis and treatment, it is a fact that most of our patients have a chronic indurated lesion with symptoms extending over an average period of 10 years and that complications have occurred singly or in combination in more than one third of them. In this large group operation is the *sine qua non* of treatment and medical measures should be employed only as complementary to surgical procedures or in

to tackle this problem. If in every hospital in the city the work in each department were in charge of one man it would be unified to the great advantage of both hospitals and patients. If there are two or more co-ordinate members of the staff in each department each will have his own way of doing things. A great many outsiders are also admitted to the hospitals. In one hospital where I work two-thirds of the obstetrics is done by outsiders. At the Cook County Hospital the work is better correlated. Would it be possible to adopt some rules in regard to consultation in important cases? If a caesarean section is proposed on a case let it be done only after consultation with one or more members of the staff. Perhaps the same rule might be adopted in cases of high forceps and version.

Dr DAVID S. HILLIS. Dr Bacon's suggestion as to a possible method of unification of procedure at the County Hospital is interesting. Personally I have not had the temerity even to suggest such a thing. I would be very pleased as a member of the staff to co-operate in a plan of that kind. I suppose that all hospitals perhaps would improve their obstetrics if no operation were undertaken without consultation. There are more sins of commission than of omission in obstetrics. If every man who operated on confinement cases had to state his reason for so doing I think we would reduce our operations about one half. If there is to be any improvement in obstetrics it must start somewhere and in this community it seems to me the Gynecological Society is the place where it should start. Obstetrics is not given more serious consideration because no one but the obstetrician is interested. The leaders in surgery, medicine and other specialties are indifferent to the problems of better obstetrics. The Shepard-Towner law implies an indictment of the medical profession of unmistakable meaning. The doctors are spending money to advertise the medical profession yet no effort is made to correct the conditions that led to the Shepard-Towner law. Is it not possible that some organized effort in this direction would be of use in the campaign to make the medical profession more popular?

Dr J. B. DELEE. In the first place I wish to express my usual incredulity about vital statistics. Statistics to be of any value at all have to be very carefully dissected. For example the Cook County Hospital cares for a certain class of patients. Another hospital cares for a different class entirely. Labor will be more likely to run a spontaneous course in one than in the other. Cook County Hospital receives patients who present immunities from infection developed from birth and who are inured to hard labor. Other hospitals receive patients who are the refined products of modern civilization and whose resistance is poorly developed. Therefore it is a waste of time to devote any discussion to comparative statistics.

Dr Bacon's suggestion is a good one. The Cook County Hospital is the only hospital I know where it is possible to have any co-operation in the staff.

There are only four obstetricians and it is a closed hospital. The four could get together and decide on the practice of obstetrics. There is no other hospital that has such a closed system. At the Lying in Hospital there were 131 different doctors beside the members of the staff who treated cases there last year and it is impossible to carry out any technique except the aseptic technique. We do insist on that. Even then men will deliberately or surreptitiously work in other methods.

The frequency of operations depends very largely on the man. Dr Hillis says that 50 per cent of the obstetrical operations would be unnecessary if the men had to write the conditions on the wall for everybody to read. I think this is even more true in surgery. You go into some hospitals and you will see cholecystectomies or cholecystostomies or gastro-enterostomies posted every day in large numbers. If every man who performs a gastro-enterostomy had to give his reasons publicly for doing an operation it would reduce the number of operations. The obstetrician is no worse than the surgeon in that regard. What is the cause of it? It is simply that practitioners do not know enough obstetrics. They have to be taught more in the line Dr Lee mentioned—fundamental obstetrics and less of the high spots. The principles have to be correlated with technical obstetrics. The work is very hard. To improve the teaching of obstetrics has been the goal of the Chicago Lying in Hospital for years and I believe today the obstetrical practice there is just as good as the surgical practice. The examples of terrible mistakes referred to by Dr Lee I can match by relating corresponding and even greater horrors that have occurred in the practice of men in our own midst and at the hands of men who have been practicing obstetrics for years and who enjoy the title of professor. We have to improve our teaching and we should spend the time teaching normal obstetrics as well as pathological and we will have to pay the teachers to do the gruelling work.

Dr W. GEORGE LEE (closing the discussion). I merely want to thank those who discussed the paper and also the members of the society for their patience. I may say that we of the Cook County Hospital think that the staff obstetrical work is very good and that we have closer co-operation there than is usually found. We do not hesitate to advise about cases as a matter of fact and we review cases of poor outcome with very free discussion. I think an underlying need is as Dr DeLee said that we should have more time and attention given to teaching fundamentals in the medical schools. I have been very much interested in finding that the students from Rush who come under my charge later come over even when they are not enrolled in my section for they say the clinical work is what they need.

ROENTGENOGRAPHIC DIAGNOSIS IN GYNECOLOGY PNEUMOPERITONEUM

Dr IRVING F. STEIN read a paper on roentgenographic diagnosis in gynecology. (See p. 83.)

ceration in the suture line regardless of the type of operation or at the gastrojejunal orifice, may appear shortly after operation. An intact gastric mucous membrane can tolerate much abuse but in the presence of ulceration or during the healing process a proper regimen may determine the ultimate success or failure of the surgical procedure. During the outpatient convalescent period it is not uncommon for uninstructed patients to eat large indigestible meals and suffer gastric retention. If this is promptly recognized and treated no harm is done but if not much discomfort and considerable delay in recovery may ensue.

So far as is now known the second group which requires supervision consists of the young careless patients with hyperacid secretion but without gastric obstruction and the nervous worried hyperirritable hard working male adults. A modified simple common sense regimen for all patients has two other advantages: it disarms criticism directed rightly or wrongly against surgeons for making short shrift of non-surgical therapeutic methods and the ailing patient who has wilfully ignored his instructions or committed gross indiscretions will not lay all the blame on the surgeon and his art. In the clinic a booklet containing instructions of a general nature, the proper selection and preparation of food and suitable recipes has been found useful and time saving. In principle the patient is advised to avoid highly seasoned coarse and fried foods, condiments, tobacco, alcoholic stimulants and strong tea and coffee. To this may be added the present day slogan so applicable to the American public: Eat half as much and twice as long.

INDICATION FOR THE USE OF ALKALIS

The importance of persistent or recurring hyperacidity in cases of postoperative morbidity is just beginning to be appreciated. Clinical hyperacidity or hypersecretion or both are present in most cases of ulcer especially during the period of active symptoms. Carlson has demonstrated its unfavorable influence on the function of the pylorus and duodenum in provoking undue spasm and contraction and thereby aggravating the symptoms characteristic of ulcer in its pres-

ence. Sippy has called attention to the association of delayed emptying and excessive continued secretion with recurrence after gastro-enterostomy. Internists and surgeons alike have stressed the highly probable causal relation of hyperacidity to recurrent ulcer. Recent contributions by Hurst, Bolton and Goodhart, Sherren and Walton have emphasized this relation. Experimental proof is not lacking. By diverting the alkaline secretions which neutralize the gastric juice, Mann and Williamson were able to produce typical subacute or chronic peptic ulcer in a high percentage of animals comparable pathologically to that found in man. In more recent experiments Mann has shown that if the ulcer is protected from contact with the gastric juice healing is complete and reasonably rapid. By the judicious use of alkalis the pain and acidity of peptic ulcer can be controlled especially when a proper diet and rest are also employed. There is clinical and experimental evidence that alkalis exert a healing influence. Dragstedt and Vaughn produced experimental ulcers in dogs many of which failed to heal normally because of the persistent irritant effect of non-absorbable sutures. When alkalis were administered in amounts sufficient to neutralize gastric secretion the lesion promptly healed. Besides their neutralizing effect, alkalis decrease gastric tonus, inhibit regional spasm in the presence of ulcer and partly immobilize the pylorus. The kymographic studies of Joseph and Hardt have shown further the inhibitory effect of alkalis and frequent feeding on gastric tonus, peristalsis and acidity. Thus we have a sound clinical and physiologic basis for the postoperative use of alkalis under definite conditions. For routine purposes a combination of calcined magnesia and bismuth subcarbonate in doses of 10 and 15 grains respectively from 1 to 2 hours after meals with a quarter of a glass of water, is recommended. A glass of rich milk may be taken an hour thereafter or may be combined with the powder. The dose may be increased or reduced and sodium bicarbonate and calcium carbonate substituted or alternated according to indications. A certain amount of caution is necessary as alkalis in unnecessarily large doses may cause gastric irritation or a

ceration in the suture line, regardless of the type of operation, or at the gastrojejunal orifice may appear shortly after operation. An intact gastric mucous membrane can tolerate much abuse, but in the presence of ulceration or during the healing process a proper regimen may determine the ultimate success or failure of the surgical procedure. During the postoperative convalescent period it is not uncommon for un instructed patients to eat large indigestible meals and suffer gastric retention. If this is promptly recognized and treated no harm is done but if not, much discomfort and considerable delay in recovery may ensue.

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plete examination of the patient. It is predicted that our increasing knowledge concerning physiologic gastric types and their variations and mode of response to treatment will furnish criteria for the proper selection of the operation. The patient who has been well chosen and skillfully operated on invariably does well without any exact postoperative regimen. Recurrent ulcers while infrequent with experienced surgeons, as a rule give rise to symptoms similar to those provoked by the original lesion and tend to assume identical histopathologic characteristics. The use of proper diet, alkalis, frequent feedings and so forth immediately after operation for about 6 weeks at least and for a longer period in certain types of cases rests on sound experimental and clinical ground. The better end results in the medical or surgical treatment of ulcer in women than in men are largely due to their superior personal and eating habits and better co-operation in general. The habitual or excessive use of tobacco is harmful to the patient with peptic ulcer. In such patients gastroenteric hemorrhage may be provoked by the abuse of alcoholic drinks or unusual exertion.

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THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By ALFRED J. BROWN, M.D., F.A.C.S., OMAHA, NEBRASKA

THE ROYAL BOOK OF Haly Filius Abbas¹
THAT period of the history of medicine and surgery following the fall of the great Grecian and Roman empires when the seat of learning moved from continental Europe to northern Africa and Asia and Alexandria became the home of culture affords almost a definite proof that practical knowledge once gained is seldom lost. At this period in the world's history transportation was very slow, printing was not to be discovered until centuries later, and the only form of record was the manuscript while knowledge was communicated either by the reading of the manuscript or by word of mouth through the bards and singers. Considering all these difficulties it seems almost miraculous that the knowledge of medicine and surgery as it then existed should have been preserved. Yet with the fall of these great nations in spite of these handicaps and in spite of differences in language medicine and surgery went on as if no change in the world had occurred. The seat of medicine passed across the Mediterranean into Arabia and Persia. Here the little spark of learning tossed away by the decadent Græco-Roman civilization alighted and was fanned into a flame by learned men. From this arose the so-called Arabian school not only in medicine and surgery but also in philosophy and mathematics. Though called the Arabian school or period it was by no means limited to the Arabs for nearly all the Orientals—Syrians, Persians, Jews, and Christians called by Arabian names became interested and each added his quota to the sum of human knowledge. The basis of this was naturally the result of the teachings of the Græco-Roman school and so we find most of their medical and surgical writings founded upon the works of Galen, Hippocrates, Dioscorides, Aëtius, Paulus of Ægina, Oribasius and others though in some cases they go back further even to the Indian and Egyptian teachers.

The Arabian school reached its height from the eighth to the thirteenth centuries. The majority of its great men were mystics and philosophers and few of them made advances in practical diagnosis or treatment. Human dissection was of course forbidden by the Koran and to aid this philosophical thought is always much easier than practical work. However in the tenth century this country furnished a physician and surgeon whose work was to

serve as a model and an authority for seven centuries.

Ali Ben el Abbas also called Haly Abbas, Haly Filius Abbas and Ala ed Din el Madschusi was born in Persia and belonged to the Magi. He studied medicine under Abu Mahir Musa. The date of his birth is not known but he died in 904, the 384th year of the Hedschra. The record of his work which remains to us today as the tangible result of his effort is called the *Almaleki* or Royal book and was dedicated to the Sultan Adhaded Daula Ben Buweik whom he served as physician in ordinary. It was the greatest book of Arabian medicine up to the appearance of the work of Avicenna. Haly Abbas's work was translated in the eleventh century by Constantinus Africanus under the title of the *Antegneum* which he put forward as his own work. A later translation was made by Stephanus of Antioch in 1127. This appeared in print first in 1492 as a book published in Venice. The volume, the title page of which is reproduced here, is the Stephanus translation augmented with notes and explanations by Michael de Capella which was printed in Quarto (Lugdunum 1523).

The surgical portion of the work occupies 57 of the 319 pages. It takes in the surgery of the entire body. Though actual practice of surgery was usually left to underlings and the actual practice of obstetrics to midwives, one is almost led to believe that this man actually did the operative work himself. His instructions are detailed and clear and it seems as if it must have taken actual practice to give him such concise knowledge. As an example in Chapter 46 when discussing after treatment of lithotomy he says: "if you fear hæmorrhage it is necessary to apply a compress on the wound wet with vinegar and water or water and oil of roses. You order the patient to lie flat on his back and you keep the compresses wet constantly with the water and oil of roses. Then on the third day remove the dressings and apply on the wound the black plaster which you have prepared. Then change the dressing each day for some time because of the strength of the urine and apply a new plaster. In addition it is necessary to tie the thighs together with bandages to assure the dressings remaining in place on the wound. If the wound shows one of the accidents to which wounds are subject such as corrosion, corruption and others it is necessary to treat it with remedies with which similar things are treated."

operations is well known, but recent developments in anæsthetics have apparently aided in definitely diminishing the incidence of such complications. In this series of cases ethylene has been the general anæsthetic combined when necessary, with novocain to produce block anæsthesia or sufficient ether to give satisfactory relaxation. Morphine 1/6 grain and atropine 1/150 grain have been given as a routine half an hour before operation. The almost total absence of pulmonary morbidity and the low mortality in 400 operations on the stomach and duodenum 113 of which were for carcinoma more than suggest the advantages of ethylene in these cases at least. The two disadvantages of ethylene are its inflammability and the difficulty of efficient administration. The former is not a menace if reasonable care is exercised and the latter can be overcome by experience. Lundy has recently introduced into the Mayo Clinic a combination of carbon dioxide with ethylene which is more effective than ethylene alone.

SURGICAL AIDS

There are certain points with regard to surgery of the stomach and duodenum which are always worthy of repetition. The first is adequate exposure in which long incisions usually in the left rectus and self retaining retractors and packs are valuable aids. The second is adequate mobilization. This applies particularly to large gastric ulcers adherent posteriorly. It is frequently possible by methodical mobilization of the stomach to carry out satisfactorily partial gastrectomy or excision, when the ulcer is situated so high that on first impression it appears to be irremovable. The third point is absolute hæmostasis. This can always be secured if scrupulous care is taken in the ligation of individual vessels and in the placing of sutures. The fourth point is the importance of avoiding incomplete operations since a primary radical operation can often be performed with no more risk than an incomplete one or one intended as the first of a two stage procedure. Another very useful adjunct is the suction pump. I have made it a routine to empty the stomach completely before finishing the operation and often to empty and collapse the distended

stomach with the pump before beginning the mobilization as suggested by Devine. Finally there must be a proper appreciation of the mechanics of whatever operation is being performed, that is the restoration of gastrointestinal continuity in such a way that adequate drainage is secured. Trauma should be kept at a minimum.

POSTOPERATIVE CARE

In the postoperative care rest of the stomach and upper intestinal tract are of first importance. The more extensive the operation the longer should this rest be maintained. For example, in cases of complicated resection fluids by mouth are withheld for as long as 4 days the proper fluid balance being maintained by proctoclysis hypodermoclysis or intravenous administration. When stimulation is needed coffee given by proctoclysis is satisfactory. The unrestricted employment of the stomach tube is of great importance. Retention of secretions is not permitted whenever uncertainty exists the tube should be passed. A quick pulse and anxious facies may be entirely due to retention. The prompt recognition of complications and their prompt control are vital. The early detection by studies of the chemistry of the blood of the toxæmia of high gastro intestinal obstruction and its control by the intravenous administration of physiologic sodium chloride and glucose solutions are now well appreciated.

OPERATIONS

The *duodenal ulcers* in the series have usually been of the type suitable for gastro enterostomy (Table II) there appeared to be relatively few cases in which a direct attack on the ulcer was called for. There were 18 cases in which usually because of hæmorrhage it seemed advisable to adopt a more radical procedure than simple gastro enterostomy. The procedure in such cases rests with the surgeon, the excision and pyloroplasty of Finney, Horsley C. H. Mayo and Judd being outstanding in value. In 4 cases of duodenal ulcer partial gastrectomy and duodenectomy were employed. While it is difficult to understand the rationale of partial gastrectomy as a primary operation for chronic duodenal ulcer,

BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgment may be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

FEEDING AND THE NUTRITIONAL DISORDERS IN INFANCY AND CHILDHOOD By Julius H. Hess M.D. 4th ed. rev. Philadelphia F. A. Davis Company 1925.

AN INDEX OF TREATMENT By Various Writers. Edited by Robert Hutchison M.D. F.R.C.P. and James Sherren C.B.E. F.R.C.S. 9th ed. rev. New York: William Wood and Company 1925.

MALIGNANT DISEASE OF THE TESTICLE By Harold R. Dew M.B. B.S. (Melbourne) F.R.C.S. (Eng.) F.A.C.S. London H. K. Lewis & Co. Ltd. 1925.

THE EARLY DIAGNOSIS OF THE ACUTE ABDOMEN By Zachary Cope B.A. M.D. M.S. (Lond.) F.R.C.S. (Eng.) 3rd ed. London and New York: Humphrey Milford Oxford University Press 1925.

AN INTRODUCTION TO OBJECTIVE PSYCHOPATHOLOGY By G. V. Hamilton M.D. Foreword by Robert M. Yerkes Ph.D. L.L.D. St. Louis: The C. V. Mosby Company 1925.

LA PRATIQUE CHIRURGICALE ILLUSTRÉE By Victor Pauchet Fascicules vii and viii Paris: Librairie Octave Doin 1925.

LISTER AND THE LIGATURE New Brunswick: New Jersey: Johnson & Johnson 1925.

ON WRITING THeses FOR M.B. AND M.D. DEGREES By Sir Humphry Rolleston Bart. K.C.B. (Hon.) D.Sc. (Oxford) D.C.L. (Durham) LL.D. (Glasgow and Bristol) 2nd ed. rev. London: John Bale Sons & Danielson Ltd. 1925.

LE SYSTÈME SPÉRIÉL By G. Conny & J. Terracol Paris: Masson et Cie 1925.

A TEXTBOOK OF OBSTETRICS By Thomas Watts Fden M.D. C.M. (Edin.) F.R.C.P. (Lond.) F.R.C.S. (Edin.) Major A.M.C. and Eardley Holland M.D. B.S. (Lond.) F.R.C.I. (Lond.) F.R.C.S. (Lond.) 6th ed. New York: The Macmillan Company 1925.

LA SEGREZIONE GASTRICA By Dott. Antonio Ciminato Bologna: Licinio Cappelli 1925.

PLASTIC SURGERY OF THE NOSE By J. Eastman Sheehan M.D. F.A.C.S. New York: Paul B. Hoeber 1925.

SAULL FRACTURES By William H. Stewart M.D. New York: Paul B. Hoeber 1925.

SCITTI MEDICI By Mario Donati & others Vols. 1 and 2 Bologna: L. Cappelli 1925.

MINOR SURGERY By Lionel R. Fildes F.R.C.S. (Edin.) New York: Paul B. Hoeber 1925.

SELECTED PAPERS SURGICAL AND PATHOLOGICAL By F. T. Paul D.Sc. Ch.M. F.R.C.S. (Eng.) London: Baillière Tindall and Cox 1925.

ELECTROCARDIOGRAPHY By Tiburcio Patilla Buenos Aires: La Semana Médica 1925.

WILLIAM CADOGAN (HIS LIVES ON GALT) By John Rubrah M.D. New York: Paul B. Hoeber 1925.

A TEXTBOOK OF OPERATIVE ORTHOPEDICS By A. Steindler M.D. F.A.C.S. New York: D. Appleton and Company 1925.

THE 1926 MEDICAL RECORD VISITING LIST
METHODS AND PROBLEMS OF MEDICAL EDUCATION
New York: The Rockefeller Foundation 1925.

OTOLOGIC SURGERY By Samuel J. Kopetzky M.D. F.A.C.S. New York: Paul B. Hoeber 1925.

PITFALLS OF SURGERY By Harold Buttrick C.B.E. M.B. B.S. (Lond.) F.R.C.S. 2nd ed. New York: William Wood and Company 1925.

BIOLOGIE UND PATHOLOGIE DES WEIBES. EIN HANDBUCH DER FRAUENHEILKUNDE UND GEBURTSHILFE By Josef Halban and Ludwig Seitz Lieferungen 18 und 19 Berlin: Urban & Schwarzenberg 1925.

GYNÉCOLOGIE CHIRURGICALE GÉNITO-STATIQUE By C. Sobre Casas Paris: Masson & Cie 1925.

THE RADIOLOGICAL EXAMINATION OF THE MALE URETHRA By G. L. S. Kohnstam M.R.C.S. (Eng.) L.R.C.P. (Lond.) and L. H. P. Cave M.B. B.S. (Lond.) M.R.C.S. (Eng.) L.R.C.P. (Lond.) D.M.R.E. (Camb.) New York: William Wood and Company 1925.

THE THERAPY OF PUERPERAL FEVER By Privatdozent Dr. Robert Koehler. American Edition prepared by Hugo Ehrenfest M.D. F.A.C.S. St. Louis: The C. V. Mosby Company 1925.

A TEXTBOOK OF PHYSIOLOGY By William D. Zoethout Ph.D. 2nd ed. St. Louis: The C. V. Mosby Company 1925.

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY IN THE WORLD WAR By Maj. Albert G. Love M.C. U.S. Army Vol. xv—Statistics. Washington: The Government Printing Office 1925.

AIMS TO SURGICAL DIAGNOSIS By Cecil P. G. Wakeley F.R.C.S. New York: William Wood and Company 1925.

SOME ENCOURAGEMENTS IN CANCER SURGERY By G. Grey Turner F.R.C.S. (Eng.) New York: William Wood and Company 1925.

THORACIC SURGERY By Howard Libenthal M.D. F.A.C.S. Philadelphia & London: W. B. Saunders Company 1925 Vols. 1 and 2.

GEBURTSHILFELICHES BREVIER FÜR AERZTE UND STUDIRENDE By Dr. Franz Eberhart Berlin: Urban & Schwarzenberg 1925.

GYNÉCOLOGIE MÉDICALE LEÇONS CLINIQUES ET THÉRAPEUTIQUES SUR LES MALADIES DES FEMMES MALADIES DE LOUVELOU By Paul Dakbé Paris: Vigot Frères 1925.

POST MORTEM APPEARANCES By Joan M. Ross M.B. B.S. (Lond.) M.R.C.S. L.R.C.P. New York: Oxford University Press 1925.

ABDOMINAL AND PELVIC SURGERY FOR PRACTITIONERS By Rutherford Morison (Hon.) M.A. & D.C.L. (Hon.) LL.D. M.B. F.R.C.S. (Edin. and Eng.) New York: Oxford University Press 1925.

LEBERZIRKULOSE KARCINOM UND NAHRUNG EINE PHYSIOLOGISCHE CHEMISCHE HYPOTHESE ZUR ERKLÄRUNG DES DREISENPROBLEMS By Dr. Med. O. L. E. DeRaadt Leiden: S. C. Van Doesburgh 1925.

L'ANATOMIE EN POCHES By Victor Pauchet and S. Dupret Paris: Gaston Doin 1926.

TRAITEMENT DES ÉPITHÉLIOMAS DU MAXILLAIRE SUPÉRIEUR PAR L'ASSOCIATION CHIRURGIE CURIOTHÉRAPIE By D. G. Verger Paris: Gaston Doin 1925.

LA PRATIQUE DES DÉVIATIONS VERTEBRALES (SCOLIOSE—CYPHOSE—LORDOSE) By Carl Roederer and René Ledent. Paris: Gaston Doin, 1926.

contraction. In practically all cases the ulcer was situated on the posterior wall near the lesser curvature. There were only 10 cases in which the ulcer was not removed either by excision or by partial gastrectomy removal being accomplished therefore in 83 per cent. One case in which the ulcer was not excised was that of a patient aged 75 years who had a high grade pyloric obstruction. He had been operated on previously for an acute perforating ulcer. Relief from the obstruction was the urgent indication and apparently nothing was to be gained from a resection of the indurated area at the pylorus. The other cases in which an indirect operation alone was done were more or less similar that is large posterior ulcers situated high in the stomach and associated with such extensive perigastritis and thickening of the gastric wall that even had the general condition of the patient been satisfactory only the indirect operation would have been justifiable.

The one death in the series of cases of gastric ulcer might reasonably be attributed to some other cause than the operation for ulcer since the condition of the patient and the size and character of the lesion made any operation for the ulcer out of the question. As the patient was rapidly failing because of his inability to eat a jejunostomy was done in the hope that by feeding for several weeks through the tube improvement would be sufficient so that operation for the ulcer could be performed. The operation was performed under local anesthesia and the patient recovered from it but at the end of a week he developed bronchopneumonia. Because of his low resistance he did not recover.

Gastric carcinoma. The surgical management of carcinoma of the stomach involves many important phases and only some of the more practical ones will be considered here. First it should be noted that the percentage of resectability is about the same in recent cases as it has been in earlier cases in the clinic namely 4. Since it is the practice in the clinic if the patient desires it to perform an exploratory operation for carcinoma of the stomach without evidence of metastasis and the total number of operations included an unusually large number of

explorations a rate of resectability of 42 per cent is not low. This rate is only attained by performing a certain number of rather questionable resections and in some cases of this series it seems almost necessary to apologize for attempting resection because the disease was so advanced. If however one is governed by the wish of the patient and follows the Golden Rule occasional extensive resections for advanced carcinoma are inevitable. Experience has shown that some of these patients have remained well and free from recurrence. Again partial gastrectomy may be undertaken as a purely palliative measure that is in the presence of known metastasis the growth being resected for actual or impending obstruction. Since resections have been performed on patients with all stages of involvement a series in which partial gastrectomy was performed 46 times for carcinoma with 1 death shows how safely such operations can be carried out (Table IV).

It will be noted that gastro enterostomy was performed comparatively rarely in cases of gastric carcinoma. Gastro enterostomy for advanced carcinoma seldom gives sufficient palliation to make it worth while and is often disappointing from every standpoint. All the resections were done in one stage however a two stage operation as pointed out by Crile is occasionally of value.

TABLE IV — OPERATIONS FOR GASTRIC CARCINOMA

Types of operation	Cases	Hospital mortality
Partial gastrectomy	46	1
Exploration	48	
Posterior gastro-enterostomy	15	
Anterior gastro-enterostomy	2	
Anterior gastro-enterostomy and enterostomy	2	
Total	113	1

Proper pre operative preparation will usually make primary resection possible if it can be done at all. Finally the methods of resection employed show that in 50 per cent it was apparently safer and easier to reestablish continuity by an antecolic end to side anastomosis adding to this in all cases except one an entero anastomosis. The Billroth I operation or its modification is not suitable because in planning a direct approximation of stomach

large and distinctive audience who paid personal tribute to the work of Dr. Da Costa.

The Wednesday evening program conducted in the ballroom included the following addresses: Dr. W. Blair Bell of Liverpool, England, on 'The Treatment of Chronic Ascending Infections of the Uterus and Adnexa by the Bell Beuttner Operation with Ovarian Conservation or Grafting,' discussions by Dr. Barton Cooke Hirst and Dr. Brooke M. Anspach of Philadelphia; Dr. Arthur H. Curtis of Chicago, on 'Chronic Pelvic Infections: Deductions Resultant from a Combined Clinical and Laboratory Study,' discussions by Dr. Charles C. Norris and Dr. P. Brooke Bland of Philadelphia; and Dr. Robert C. Coffey of Portland, Oregon, on 'The Principles of the Radical Treatment of Cancer of Pelvic Organs,' discussion by Dr. John B. Deaver of Philadelphia.

THURSDAY, OCTOBER 29

Clinics were held on Thursday at the various hospitals. At 3 o'clock the annual meeting of the American College of Surgeons was held in the ballroom of the Bellevue Stratford. Dr. W. W. Chipman of Montreal was elected president; Dr. Clarence L. Starr of Toronto, first vice president; and Dr. Charles F. Nassau of Philadelphia, second vice president. The following regents were elected for the term expiring in 1928: Dr. James B. Eagleson of Seattle; Dr. J. M. T. Finney of Baltimore; Dr. C. H. Mayo of Rochester; Dr. Robert E. McKechnie of Vancouver; and Dr. J. Bentley Squier of New York. Complete reports of the various departmental activities of the College were given at the annual meeting and will be published in the 1926 *Blue Book*.

The Thursday evening program began promptly at 8 o'clock with the president, Dr. Rudolph Matas, in the chair. A symposium on the Rehabilitation of the Handicapped Surgical Patient was participated in by a group of the younger surgeons as follows: Dr. George B. Eusterman; Dr. Donald C. Balfour; Dr. Hermon C. Bumpus; Dr. Verne C. Hunt; and Dr. Waltman Walter of Rochester, Minnesota; Dr. Robert S. Dinsmore of Cleveland; and Dr. Frank H. Lahey and Dr. Burton E. Hamilton of Boston. The program was closed with an interesting address on the Use of Insulin in Surgery and Obstetrics by Dr. F. N. G. Starr of Toronto. These papers were ably discussed by Dr. George P. Muller and Dr. John H. Jopson of Philadelphia.

FRIDAY, OCTOBER 30

Friday was the closing day of the Congress. Clinics took place at the various hospitals. At 11

o'clock in the morning the new candidates for Fellowship were assembled and given instructions as to the procedure of the Convocation. The evening session in the ballroom was one of the most impressive ceremonies ever held in connection with the Clinical Congress of the American College of Surgeons. The invocation was delivered by the Reverend John B. Laird of Philadelphia. Dr. Thierry de Martel of Paris was present and as a representative of the French Republic conferred upon Dr. Charles H. Mayo the Legion of Honor of France. In introducing Dr. de Martel, Dr. Matas spoke as follows:

The president has the pleasure to recognize the presence in this assembly of one of the most distinguished surgeons of France, an honorary Fellow of the College, a friend of America and of our institutions, and always a welcome guest of this College.

Dr. Thierry de Martel has come to us with a special mission from the government of the French Republic which he wishes to discharge on this auspicious occasion and in the presence of our assembled Fellows.

It is with pleasure that we will interrupt our proceedings to make room for Dr. de Martel, since he desires to honor the achievements of American surgery in the person of one of our Fellows—one whose name I need not mention now, but one whom we all love and who you will agree with your president is worthy of all the honors the world may choose to bestow upon him.

Fellowship degrees were conferred on the new candidates and honorary degrees upon the following distinguished guests: The Rt. Hon. Lord Dawson of Penn; Sir William Arbuthnot Lane, Bart.; Dr. Philip Franklin, all of London, England; Dr. W. Blair Bell of Liverpool, England; and Professor Vittorio Putti, of Bologna, Italy. One of the most pleasing features of the program was the conferring of honorary degrees upon two of the veteran surgeons of America: Dr. Frederic S. Dennis of New York and Dr. William Henry Carmalt of New Haven.

The Fellowship address was delivered by Lord Dawson of Penn, personal physician to His Majesty the King of England. It was a masterly address and thoroughly appreciated by the large audience present. The president's introduction of Lord Dawson follows:

Medicine has given to the world many illustrious sons who throughout the ages have contributed to the intellectual and moral as well as to the material forces that have molded and advanced civilization. Philosophers, poets, artists, inventors, explorers, warriors, religious

HYPERTHYROIDISM IN CHILDREN

By ROBERT S. DINSMORE, M.D., CLEVELAND, OHIO
CHIEF, I. & C.

THE incidence of hyperthyroidism in children as has been pointed out by Hyman is probably higher than would be supposed from the comparatively small number of cases which have been reported in the literature. In all of the 48 cases here reported the patients were under 14 years of age.

Buford in a very exhaustive review of both foreign and American literature found only 8 cases of exophthalmic goiter in children under 5 years of age and only 18 cases in children under 12 years of age in a total series of 1,517 cases. In 1913 Lewis of the Mayo Clinic reported 5 patients all under 10 years of age. In none of these series was there a male patient. In 1923 Cowden who had gone over the literature on this point noted that exophthalmic goiter had not been reported in a male child under 10 years of age. In a series

of 3,477 cases Klein reports only 154 under the age of 15, and in this series the males were above 12 years of age. Bram who has had a very large experience in treating exophthalmic goiter reports a series of 43 patients under the age of 15, his youngest patient being just past her fifth birthday. Barrett reports 1 patient only 2½ years of age. In 1912, White reported a case of congenital Graves disease and Klaus in 1914 reported the presence of hyperthyroidism in an infant of 9 months.

In our series 1 patient was 5½ years old, one 7, although the onset of the disease could be definitely placed at the age of 3, 2 were 8 years of age, 2, 9, 3, 10, 4, 11, 3, 12, 13, 13, and 17, 14 years of age. Among the males 6 were 14 and 2 were 11 years of age.

It has been difficult to find a definite etiological factor to which hyperthyroidism



Fig. 1. Hyperthyroidism in child 7 years 5 months of age. At left patient at age 12 years before development of hyperthyroidism. At right appearance of patient on admission to clinic. Father had exophthalmic goiter, mother adenoma of the thyroid. Syndrome of hyperthyroidism followed attack of whooping cough at age of 3 years. Bilateral exophthalmos, smooth cylindrical enlarged thyroid gland, brunt and thrill pulse.

Fig. 2. Hyperthyroidism in child 10 years of age. At left patient at age 6 years before development of hyperthyroidism. At right appearance of patient on admission to clinic. Duration of hyperthyroidism 1 year. Three sisters with goiter; patient extremely nervous, had taken 100 mg. of iodine in each month for 9 months; was easily fatigued; parents had noticed prominence of eyes and rapid heart. Bilateral exophthalmos, bilateral enlargement of thyroid with brunt and thrill was present. The heart was enlarged; the left pulse rate was 118. Ligation was followed by resection; thyroidectomy was performed with secondary closure.

profited by your visit, as well as having gained a more intimate knowledge of its medical personnel, institutions traditions and history

It seems to me that on the very threshold at which a welcome is extended I may appropriately remind you that you now find yourselves in not only the Cradle of American Independence, but the Cradle of American Medicine as well. I make this statement to the end that you may embrace the opportunities of the next few days to gain a more intimate familiarity with the foundations of American medicine as well as to profit by the addresses and clinical demonstrations which have been arranged for this gathering.

In focusing your attention for one brief moment upon certain epochal events and personalities I disclaim the indulgence of undue pride in the place of my residence education and labors and assume on your part an interest and pride in those medical achievements which have redounded to the credit of American medicine and belong to its history. The accomplishments of Philadelphia and Philadelphians cover a wide range of medical activities scientific educational literary institutional and personal. May I point out a few of them?

In 1730 Thomas Cadwalader delivered here the first public medical lectures and dissections given in America. In 1742 he also made for purely scientific purposes the first postmortem examination and in 1745 he published (Benjamin Franklin printer) the first of our scientific contributions. In these and days it may be of mild passing interest to recall the title of the paper—An Essay on the Essential Nature of the West India Dry Gripes. The condition with which the paper dealt was as a matter of fact lead colic a frequently encountered affection in those bibulous times and was occasioned by the too liberal indulgence in the fashionable drink of the period a rum punch the rum having been distilled through lead pipes contained sufficient lead to cause the disorder known as the West India Dry Gripes.

I may remind you of the founding of the two oldest hospitals in America—the Philadelphia Hospital in 1731 and the Pennsylvania Hospital in 1752. Benjamin Franklin was one of the organizers of the latter. It was within its walls that Thomas Bond gave the first regular course of clinical instruction in America for the benefit of the medical profession. In 1762 in the same place William Shippen Jr. offered the first systematic course of public lectures on anatomy and midwifery. Three years later in 1765 his pedagogic ambitions found greater opportunities in a medical school established by himself. John Morgan

and Benjamin Rush—now the Medical Department of the University of Pennsylvania the oldest medical school in America. Benjamin Rush was the first really great American physician designated by Lettsom, the Sydenham of America.

Philadelphia early took the lead in medical authorship. In 1775 John Jones a Philadelphia student, published the first American treatise on surgery. It is entitled 'Wounds and Fractures' and was almost the sole dependence of the surgeons of the Continental Army. Members of the faculties of the two great medical schools later supplied the first American textbooks. Among these each the first of its kind were Barton's *Materia Medica* 1798 Wistar's *Anatomy* 1811 Dorsey's *Surgery* 1813, Bard's *Obstetrics* Cove's *Medical Dictionary* 1808 and Eberle's *Practice of Medicine* 1829.

Cove was also the founder of medical journalism in America.

Still later in 1839 was Gross's book on *Pathological Anatomy* the first systematic contribution on that subject in America.

It was here that the first United States Dispensatory was compiled and published in 1835.

Some of the other foundation stones of American medicine that may be mentioned are the first medical museum the Philadelphia Dispensary the first institution of its kind opened in April 1786 the first College of Pharmacy in America the organization of the American Medical Association in Philadelphia in 1847 with a Philadelphian Dr. Nathaniel Chapman for its first president. Dr. Chapman was the originator of medical postgraduate instruction many years before.

In a surgical retrospect we find much of interest. Surgery flourished here from the beginning. Philip Syng P. Hysick is styled the father of American surgery as Marion Sims is deservedly called the father of gynecology. It was here that the operation for the removal of vesical stone was first performed. Not far from here Washington L. Atlee perfected a technique for ovariectomy and for the removal of uterine fibroids. McClellan, Pancoast, Mutter, Agnew, Gross and Keen advanced both scientific knowledge and practical surgical technique in addition to their labors as great medical teachers. John H. Brinton Philadelphia surgeon laid the foundation of the great Army Medical Museum of Washington.

Still other Philadelphians who left their impress upon American medicine were John K. Mitchell who first clearly promulgated the germ origin and propagation of disease in his classic essay on 'The Cryptogamous Organ of Malaria' Horatio C. Wood, the father of American experimental phar-



Fig. 6 Hyperthyroidism in child 13 years of age. Patient has had goiter since birth, no symptoms until 6 months ago, developed nervousness, rapid heart and lost 40 pounds following an attack of grippe, exophthalmos and tremor, bilateral nodular goiter, pulse 120, basal metabolism rate +56 per cent.

which the hyperthyroidism was very definitely increased during an attack. In another case a child of 8 years, a visit to the dentist was followed by a nervous breakdown accompanied by nausea and vomiting which necessitated her remaining in bed for 3 days after which a bilateral enlargement of the thyroid developed with bristly thrills and a pulse rate of 134.

The question as to whether iodine may produce an induced hyperthyroidism is raised by its widespread use in the schools for prophylactic purposes. Hyperthyroidism which may be due to this cause does occur but fortunately in a very small percentage of cases. Marine and Kimball report that among 4,415 school children who received this treatment hyperthyroidism developed in only $\frac{1}{2}$ of 1 per cent and that in these cases the condition disappeared promptly when the iodine treatment was discontinued. DeQuervain reports the interesting case of a

child of 9 years who had a small goiter which was unaffected by the weekly administration of 5 milligrams of iodostarine. When the dosage was increased to 175 grams of iodine weekly, the goiter diminished in size but symptoms of marked hyperthyroidism appeared—tachycardia, loss of weight and extreme nervousness. When the iodine was discontinued these symptoms disappeared but the goiter again began to increase in size. DeQuervain believes that the risk from iodine in these cases is almost nil if the dose does not exceed 3 milligrams. The effect of large doses of iodine was illustrated also in one of our cases, a girl of 14 years who for four months had received excessive doses of iodine. During this time a marked hyperthyroidism developed which persisted in spite of the discontinuance of the iodine. When we saw her 6 months later the hyperthyroidism was still very marked, she was extremely nervous and had a very rapid pulse.

As has been noted above in most of the cases in our series there has been no familial history of goiter or thyroid enlargement or of infection and in most of the cases the illness has lasted for months rather than for years.

Our observations regarding the sequence of symptoms in these cases conform with those of Burnett, namely, nervousness followed by enlargement of the thyroid gland with tachycardia and exophthalmos. The nervousness and irritability of the children are usually the characteristics first noticed by the parents. Some writers have contended that exophthalmos in these children is a rare symptom in a series of 39 cases Barrett reported that exophthalmos was present in only 8. This has not been our experience.

Griffith has pointed out that tremor occurs less frequently in children than in adults but Klein thinks that tremor usually follows the appearance of the tachycardia and irritability. Tremor was noted in 25 of our 48 cases.

Sixteen of the children in our series showed loss of weight, 1 child of 14 years lost 20 pounds and 2 others both 13 years old each lost 13 pounds. Many of these children, however, show no change in weight so that this is not a constant symptom.

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SYMPOSIUM THE CARE OF THE HANDICAPPED SURGICAL PATIENT

GEORGE B EUSTERMAN M D

DONALD C BALFOUR M D

ROBERT S DINSMORE M D

FRANK H LAHEY M D AND BURTON E HAMILTON M D

F N G STARR M D AND A G FLETCHER M D

HERMON C BUMPUS M D

VERNE C HUNT M D

WALTERMAN WALTERS M D

TREATMENT FOLLOWING OPERATIONS FOR ULCER OF THE DUODENUM AND STOMACH¹

By GEORGE B EUSTERMAN M D ROCHESTER MINNESOTA

Secr n Med M J C

WITH the marked increase in our knowledge of the physiological effects and complications of various diseases more active co operation in treatment between the internist and surgeon is demanded. Surgical mortality has been reduced by the practical application to the pre operative preparation of patients of the fruits of modern scientific research particularly those of the biochemist and physiologist. This applies especially to operations in the presence of diabetes or cardiovascular disease disease of the thyroid, kidneys or prostate or of the biliary tract associated with jaundice and last but not least gastro intestinal lesions complicated by retention or obstruction and the resulting characteristic toxæmia. The success achieved in this group by the pooling of our therapeutic resources is the best argument for future co operation in other fields.

In the treatment of patients who have been operated on for benign lesions of the stomach

and duodenum the resources of the internist have not been sufficiently employed. Balfour has said that the internist should play a large part in making certain the good results that ought to follow proper surgical measures in suitable cases. In this connection the classification of dyspepsia into medical and surgical is unfortunate. There is no class of cases in which the close co operation of internists and surgeons is more productive of results. In a recent interview Boas remarked that such an illogical classification only makes the internist cognizant of the failures of the surgeon and conversely magnifies for the surgeon the failures of the physician. He felt that in America in particular, there was evidence that the spirit of co operation between these two big branches was being increasingly manifested.

The disappointments following gastric operation the late sequelæ are interesting to study but sometimes difficult to avoid. The causes of them give the surgeon, clinician and

adults excepting that it should be borne in mind always that especial care must be exercised in handling these children as they are very susceptible to every form of stimuli and may be very ill after the operation. While cases of acute hyperthyroidism may occur, I believe they are of rare occurrence. In nearly all our cases certainly the condition was chronic and such cases are never cured. I believe unless the gland is removed. Eleven of our cases were not operated upon. These included one case in which hypopituitarism was present and treatment was directed to that condition, 7 in which a period of "watchful waiting" was advised, one in which we felt that a preliminary tonsillectomy and adenoidectomy were indicated and 2 cases of induced hyperthyroidism which cleared up when the administration of iodine was discontinued. As these children are all very poor operative risks the same careful handling is required as in severe cases in adults. In nearly every instance it is necessary to ligate the superior thyroid artery, first on one side and a few days later on the other side 3 months before the thyroidectomy is performed. The reaction even to the ligation, is often very marked. Chart 1 shows the reaction following a thyroidectomy in a child 8 years old. In the latter case the child was extremely ill for 48 hours but later made an uneventful recovery.

The presence of foci of infection and their removal brings up an important point in the management of these cases. We have found

that invariably the child will obtain greater benefit from the thyroidectomy than for instance from the removal of the tonsils and we have found moreover that a tonsillectomy performed in the presence of severe hyperthyroidism is apt to cause a very severe reaction. This is illustrated by Chart 2. We have therefore concluded that in severe cases the goiter should be removed first, the removal of foci of infection being deferred until after the child has recovered from the thyroidectomy.

CONCLUSIONS

Hyperthyroidism in children is perhaps more common than has been supposed and reported cases will undoubtedly appear more frequently in the future.

The etiology is unknown. A small percentage of the cases reported in the literature and in our own series followed acute infections but ordinarily there is no tangible factor to which the disease can be attributed. The onset is abrupt and the clinical course rapid. Induced hyperthyroidism may follow the prophylactic use of iodine in a very small percentage of cases but this can usually be controlled by the discontinuance of the iodine.

These children are extremely susceptible to all kinds of operative procedure and must be handled with extreme care.

In the presence of other foci of infection the goiter should be removed first, the other foci of infection being removed after the patient has recovered from the thyroidectomy.

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SYMPOSIUM THE CARE OF THE HANDICAPPED SURGICAL PATIENT

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TREATMENT FOLLOWING OPERATIONS FOR ULCER OF THE DUODENUM AND STOMACH¹

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Sect. Med. in M. Y. Clin.

WITH the marked increase in our knowledge of the physiological effects and complications of various diseases more active co operation in treatment between the internist and surgeon is demanded. Surgical mortality has been reduced by the practical application to the pre operative preparation of patients of the fruits of modern scientific research particularly those of the biochemist and physiologist. This applies especially to operations in the presence of diabetes or cardiovascular disease, disease of the thyroid kidneys or prostate or of the biliary tract associated with jaundice and last but not least gastro intestinal lesions complicated by retention or obstruction and the resulting characteristic toxæmia. The success achieved in this group by the pooling of our therapeutic resources is the best argument for future co operation in other fields.

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The disappointments following gastric operation the late sequelæ are interesting to study but sometimes difficult to avoid. The causes of them give the surgeon, clinician and

¹Presented at the Clinical Congress of the American

College of Surgeons, Philadelphia, October 6-10, 1925

apparent maximum improvement. In a personal conversation with me, Dr. Pemberton stated that because of some reactions that had occurred when he had operated during this period of apparent maximum improvement he has made it a rule to delay operation until 4 days after the apparent maximum improvement is noted. This has been our experience also. In our uncomplicated cases the period of maximum improvement after the administration of Lugol's solution has appeared at about the eighth day. The optimum time for the operation therefore is on the twelfth day. In a certain group of patients even after this interval there is a question as to whether or not the lobectomy can safely be performed. These cases emphasize the value of a 'trial ligation'. If no reaction follows the ligation then the lobectomy can safely be performed. Our experience has been also that it is most advantageous to perform the operation after a single course of treatment with Lugol's solution as it may be extremely difficult to reproduce the same status after successive courses of treatment. I wish to call attention to Dr. Donald Guthrie's excellent editorial on the use of Lugol's solution, which appeared recently in this journal.

The second group of handicapped goiter patients namely children with hyperthyroidism must be handled with especial care. Hyperthyroidism in children is characterized by an abrupt onset and usually a short clinical course. Even after the most careful and painstaking preparation they are apt to react seriously to any operative procedure. Often both the local and the general anesthetic even if the latter is not carried beyond the stage of analgesia have a bad effect on these children. Therefore the operation should be so planned as to require a minimum amount of the anesthetic and the surgeon should be prepared to interrupt the operation at any moment. Excellent results often follow ligation in these cases the improvement often being far more striking than that seen in adult patients. A special word of caution should be offered regarding the danger of performing a tonsillectomy in the presence of hyperthyroidism in children as the reaction may be much more severe even than that which

follows the thyroidectomy. In these cases it should be the routine procedure to perform the thyroidectomy first.

As for the third group of handicapped goiter patients elderly people with adenomata of long standing the precautions and special measures outlined above for the protection of patients with hyperthyroidism are equally applicable to these cases.

As for the fourth group patients with intrathoracic goiter one point which is of especial importance is concerned with the postoperative care that is danger from the extravasation of blood in the mediastinum. Unless the surgeon is perfectly sure that there is complete haemostasis the cavity should be packed with gauze and a secondary closure made. In this connection it should be added that after any thyroidectomy the control of wound secretion is very important. For myself I prefer to put in a small gauze drain which is removed at the end of 10 or 12 hours never allowing it to remain longer than this period as the charts of these patients show that in some cases at the end of 8 hours the pulse rate begins to increase and the temperature to rise. Both drop however just as soon as the drain is removed since during the first period the gauze absorbs the wound secretion while after that time it becomes in effect a dam.

A general discussion of the various postoperative complications which may occur is not within the scope of this paper, but I do wish to mention postoperative tetany. Fortunately this is of infrequent occurrence but it is very distressing when it does occur. The first symptoms of the condition may be a circumoral pallor accompanied by slight tingling of the hands and feet and nervousness. These symptoms are usually transient and are limited to two or three attacks. In a small number of these cases however generalized tonic convulsions develop with characteristic contractures of the hands and feet and occasionally with laryngeal stridor. In the treatment of this condition we formerly gave an intramuscular injection of 20 cubic centimeters of a 25 per cent solution of magnesium sulphate. This always produced relaxation but on the other hand when convulsions occurred we could be reasonably certain that

those cases in which there are serious contra indications to operation Ryle asserts that the most important contra indications to gastrojejunostomy are a short history well marked hypertonus a high abrupt curve of acidity and rapid emptying and that the most reasonable indications for operation apart from obvious stenosis are a long history subnormal tonus a slowly climbing curve and slow emptying. I have been repeatedly impressed by how easily gastric acidity is brought under control or complete neutralization accomplished in some patients undergoing treatment in hospitals and how favorably they respond to gastro enterostomy and how in others the opposite results may obtain at least under treatment. This varying result with an increasing knowledge of variations in physiologic types gives great promise of informing the surgeon beforehand what type of surgical procedure is indicated and what the ultimate results will be.

POSTOPERATIVE CARE

Clinical course The necessity for postoperative supervision in well selected cases is not great although in many instances a regulation of the mode of living and eating correction of certain habits or the eradication of infective foci is indicated. When symptoms do recur the nature and extent of postoperative care is usually dependent on their nature and severity. Of major importance are epigastric pain or distress nausea epigastric fullness regurgitation and vomiting and hemorrhage from whatever cause or source. Many of these symptoms singly or in combination may be engendered either by functional disturbances or organic lesions. In the former case they invariably resolve under medical supervision and treatment. The factors to be kept in mind are failure of the primary ulcer to heal or its reactivation irritation of the tissues about the stoma motor disturbances from mechanical causes and recurrent lesions which may also provoke motor impairment. The diagnostic factors furnished by the anamnesis clinical examination gastric analysis and radiologic examination are usually sufficient to determine the source of the complaint. In a recent study of 150 cases with secondary

or anastomotic ulcers, it was shown that the symptoms resulting therefrom were usually similar to those provoked by the original lesion and had a tendency to assume identical histopathologic characteristics (13). It was also observed that the ulcer which gave rise to mild or vague symptoms, with normal or subacid gastric contents and which had a tendency to bleed invariably had its origin in focal infection. About half of these were not seen fluoroscopically and had a definite tendency to recur or continue to bleed after operation if the infective foci had not originally been eliminated.

Dietetic principles A proper dietetic regimen is essential to cure or relief in all types of intrinsic gastric disturbances. It appears to be a matter of common sense that a stomach handicapped by disease and the temporary trauma and disability imposed by operation should not be subjected to gastronomic insult. There is a disagreement of opinion as to the degree to which postoperative management should be carried out. Balfour believes that susceptible patients might develop functional digestive disturbances in exchange for the organic complaint when the postoperative treatment is too rigidly exacting. On the other hand one might rightfully argue that no supervision would be productive of greater mischief to the greater number. The obvious thing to do is to individualize treatment after a consideration of all the facts. There is no reliable evidence that adequate postoperative treatment has prevented recurrence or the formation of a gastrojejunal ulcer although it is reasonable to assume that it could. It may prevent and does relieve the more common disturbances of a functional nature. It is surprising how well patients have done with little or no restriction in diet or regulation of family habits of eating. In my opinion medical supervision for from 4 to 6 weeks at least after operation is important until complete healing has occurred and in the group in which postoperative sequelæ might reasonably be expected.

Flint has shown in animals that the new formed anastomosis is the site of a healing ulcerated surface for about 2 weeks. Clinical experience repeatedly demonstrates that ul-

this group with severe rheumatic heart damage but with neither auricular fibrillation nor failure

Of 67 operative cases with hypertension regular heart beat and enlargement of the heart secondary to the hypertension 1 died. Four had congestive heart failure. 2 had persistent alternation of the heart beat. 2 had had hemiplegias.

Of 37 cases selected for gross enlargement of the heart or auricular fibrillation or anginal or congestive failure (or combinations of some of these) attributable to cardiovascular sclerosis (obviously very poor cardiac risks) 3 died.

A few cases of clinical cardiovascular lues have been operated upon without a death.

A small group of 22 cases with probable congenital heart disease furnished 4 operative deaths and some unpleasant surprises.

Of 150 cases with established auricular fibrillation (many of these with otherwise badly damaged hearts and with decompensation) there were 6 operative deaths.

A group of more than 100 patients with gross congestive heart failure and thyroid toxicity have been operated upon with 3 deaths.

In all the cases enumerated the patients clearly had severe cardiovascular disease. No one could wish for them as surgical patients.

Study of the deaths in the whole group shows that those cases with severely damaged hearts such as mitral stenosis or aortic regurgitation but without congestive failure or auricular fibrillation had a negligible mortality (excepting the small group with suspected congenital heart disease). The distinct impression left with us by most of the dangerous cases those with failure auricular fibrillation or both is that they have tolerated operative procedures surprisingly well. Most of this group did not have any actual choice of risk. They were disabled and with little chance for improvement. Removal of the apparently significant surgical burden was the only promising chance for improvement.

We wish to stress also the importance of searching such patients for surgically removable burdens. The patients with both thyroid toxicity and congestive heart failure first called our attention to the possibility of re-

lieving cardiovascular disability in suitable cases by surgical removal of a coincident burden. We have reported this extremely gratifying group. It includes many cases hopelessly disabled in spite of prolonged medical treatment who were returned promptly and safely to full ability by removal of the toxic thyroid. This is a unique group cardiac capacity being restored so strikingly by the removal of a surgical burden.

In an occasional case of rheumatic heart disease without previous disability congestive heart failure has developed in the latter months of a pregnancy. The failure has persisted in spite of medical treatment until well after delivery with unexpected satisfactory return of ability following. These cases have suggested to us also the possibility that some other large coincident mechanical burden surgically removable may in occasional cardiovascular cripples be the determining factor in disability.

Exclusive of the thyroid cases and those with the burden of pregnancy no single large group of such complicating surgical burdens is to be expected among cardiovascular cripples. We have however a small but steadily growing group of such patients improved of disability by the removal of a coincident diseased gall bladder or a large pelvic tumor.

The operability of patients with severe cardiovascular disease is not generally appreciated nor consequently the possibilities of indirect surgical treatment. Many of our thyrocardiacs have been disabled for long periods while under the care of excellent physicians before the significance of a toxic adenoma or obscure signs of thyroid toxicity was suspected. Along the same lines histories could be given of cases in which a significantly diseased gall bladder or large uterine fibroid was overlooked or wrongly deemed not operable in the face of an obvious cardiovascular handicap. Experience indeed shows that this point of view is often not appreciated by the man whose position makes him apt to be frequently appealed to for final judgment as to surgical risk and advisability of surgery.

We wish finally to stress the need of careful preparation of cardiovascular patients for surgical treatment. We are not fatuous enough

tendency to alkalosis, as emphasized by Hardt and Rivers

UNFAVORABLE EFFECT OF TOBACCO

The excessive use of tobacco is deleterious to the health of the patient with peptic ulcer. In those susceptible to the influence of nicotine, moderate amounts may be harmful. The patient who craves tobacco invariably consumes excessive amounts and the habit should be discouraged. Langley showed that nicotine paralyzes the synapses of the sympathetic nervous system so that dyspeptic symptoms in habitual smokers are logical, owing to unopposed vagal action. Wagner concluded from a recent investigation that all the subjective and roentgenologic signs of duodenal ulcer can be produced by the excessive use of tobacco. During the last decade the typical syndrome of peptic ulcer has been occasionally observed in young adults given to excessive cigarette smoking and their discomforts have disappeared largely through the discontinuance of the habit. Moynihan is convinced that smoking is a harmful habit under the circumstances that an attack of duodenal ulcer often follows an orgy of tobacco and that abstinence may check such an attack. German clinicians are loath or refuse to accept for treatment the patient with peptic ulcer whose fingers are tobacco stained. I have frequently noticed the peculiar psychologic fact that patients of physicians who are inveterate smokers are not as a rule warned to discontinue or restrict the use of tobacco.

The definitely better end results that are obtained in either the surgical or non surgical treatment of ulcer in women should furnish a therapeutic hint and justification for post operative precautions. While factors of an anatomic physiologic and occupational nature may play a part I feel that such greater success is due more to their whole hearted and continued co operation regarding matters of diet and mode of eating and to the fact that generally speaking they are not handicapped by the excessive use of tobacco and alcohol.

FACTORS PROVOKING HÆMORRHAGE

Exact determination of the cause and source of hæmorrhage from the upper diges-

tive tract is often extremely difficult. The effect of extragastric conditions is not generally appreciated. While it is important to exclude a lesion of the stomach or duodenum in every instance of hæmorrhage the fact remains that chronic intrinsic lesions are not found in the majority of all patients with hæmatemesis or melæna. It is true that when the hæmorrhage is the result of a bleeding ulcer, its complete removal insures against further hæmorrhage unless extrinsic conditions are also present which may give rise to hæmorrhage such as cirrhosis of the liver, chronic cholecystic disease with or without hepatitis, hæmophilia and splenic disease. I have recently observed that unusual exertion or an alcoholic debauch by patients with ulcer or conditions extrinsic to the stomach which may provoke gastro enteric hæmorrhage is likely to be followed by hæmorrhage. I could cite a number of interesting case records to prove this point. Patients for whom gastro enterostomy has been successfully performed for bleeding ulcer may after years of complete health have another hæmorrhage the result of such unaccustomed exertion as cranking a car in cold weather, felling a large tree, driving forty or fifty golf balls during practice or strenuous hunting. An alcoholic debauch may have the same effect. Instances are also on record of patients who have had symptoms of peptic ulcer for a long time but without hæmorrhage experiencing a hæmorrhage after the injudicious use of alcohol especially the moon shine brand. The last instance of severe hæmorrhage and anemia following exertion that I saw was in a dyspeptic patient who at operation had chronic cholecystitis and hepatitis without a demonstrable lesion in the stomach or duodenum.

SUMMARY

The co operation of internist and surgeon in the pre operative preparation of patients has strikingly reduced the surgical mortality in various types of diseases. A similar pooling of therapeutic resources after operation should reduce surgical morbidity to a minimum. Pre operative factors enhancing surgical end results in cases of benign gastroduodenal lesions are their proper selection both from a general and a special standpoint and the com-

PREPARATION OF PATIENTS FOR PROSTATECTOMY¹

BY HERMON C. BUMPUS, JR., M.D., ROCHESTER, MINNESOTA

S. L. N. O. U. L. E. Y. M. Y. O. C. I. C.

IN the care and preparation of patients with prostatic hypertrophy for operation there are four main points to consider (1) the duration and amount of the obstruction (2) the indications for and against cystoscopy, (3) the care and treatment of associated infection and (4) the restoration of impaired renal function to a point compatible with major surgical measures.

Duration and amount of obstruction. The duration of the obstruction is of course largely determined by the history but evidence obtainable from cystograms is more reliable. If the obstruction has existed for only a short time there is slight if any deformity of the bladder (Fig. 1). If it is of longer duration the outline becomes trabeculated and irregular and is characterized by multiple cellules where the mucosa has projected through the muscle fibers (Fig. 2). When the obstruction is of extreme duration the bladder tends to become cone shaped and irregular in outline and is usually associated with one or more diverticula (Fig. 3). The recognition of the presence of diverticula is important for if they do not empty freeing the urine from infection becomes impossible and when large their surgical removal considerably increases the operative risk. To make certain of the presence and position of diverticula cystograms should be taken in triplicate. Two plates exposed with the shadow of the bladder projected from either side will usually show the shadow of the diverticula well beyond the bladder outline. The third cystogram taken after emptying the bladder shows diverticula that do not drain. In the interpretation of such cystograms care must be taken not to confuse the shadow of the elongated dome of the bladder as it projects beyond the shadow of the body of the bladder with that of a possible diverticulum. The error is not difficult to make.

The extent of the obstruction is ascertained by the amount of residual urine present. If

it is less than 120 cubic centimeters intermittent catheterization for a minimal period of 10 days is usually sufficient preparation, provided renal function is adequate. If the amount of residual urine is more than 120 cubic centimeters the introduction of a permanent urethral catheter is preferable. This reduces manipulation to a minimum insures continuous emptying of the bladder and thus prepares it for the condition which will exist after operation.

Indications for and against cystoscopy. In cases of prostatic hypertrophy cystoscopy should be avoided if possible. The passage of any rigid instrument is bound to traumatize the urethra in such cases. A roentgenogram reveals the presence of stones or diverticula and rectal examination reveals fairly accurately the size of the gland so that little additional knowledge would be obtained by cystoscopy. Only in those cases in which the symptoms are out of proportion to the prostatic enlargement is cystoscopy indicated. Such a discrepancy is usually due to one of three causes.

One cause is paralysis of the bladder musculature the result of a lesion of the spinal cord in which case cystoscopic examination in the absence of prostatic enlargement reveals trabeculation and atony of the bladder usually associated with relaxation of the urethral sphincter. Occasionally such nerve lesions occur in conjunction with benign hypertrophy when the prognosis as to functional result following prostatectomy should be most guarded since atonic bladders are slow to heal and suprapubic sinuses irritatingly persistent while the amount of residual urine may increase rather than diminish as a result of the further injury to the nerves incident to the operation.

A second cause of discrepancy between physical findings and symptoms is confinement of the hypertrophy to the median lobe. If the prostatic enlargement extends into the bladder rather than the rectum it is not de-

FUNDAMENTAL PRINCIPLES IN SURGERY OF THE STOMACH AND DUODENUM, REPORT OF FOUR HUNDRED CASES¹

BY DONALD C BALFOUR M.D. F.A.C.S. ROCHESTER MINNESOTA

SINCE January 1924, a certain routine has been followed at the Mayo Clinic in the management of patients with serious or complicated lesions of the stomach or duodenum particularly carcinoma of the stomach recurring peptic ulcer and pyloric obstruction. More intensive study and pre-operative preparation of such patients by the gastro enterological staff has added very definitely to the efficiency of their treatment and has made more exact and safer operations possible. My own experience with observing such patients in the hospital pre-operatively in conjunction with the gastro enterological staff has been so gratifying that I wish to report a series of 400 consecutive operations for lesions of the stomach and duodenum which were done in a period of 15 months following the establishment of this practice.

OPERATIVE MORTALITY

In this series of 400 cases there were 4 operative deaths: 1 from bronchopneumonia 10 days after a difficult partial gastrectomy for advanced carcinoma involving the pancreas the resection having been ill advisedly undertaken as a palliative measure to relieve obstruction; 1 from acute pancreatitis following partial gastrectomy for multiple gastrojejunal ulcers associated with subacute pancreatitis; 1 from the extension of a retroperitoneal infection into the general peritoneal cavity 10 days after excision of a large bleeding duodenal ulcer of the posterior wall and followed by gastro enterostomy in a patient with marked secondary anemia; and 1 following jejunotomy for a large subacute perforating ulcer at the cardia in a patient whose condition was so bad that even this operation was questionably advisable (Table 1).

I have recently emphasized the importance and value of co-operation between internist and surgeon in the care of such cases² particu-

¹ Donald C. Balfour: Operation between internist and surgeon in the management of complicated gastric and duodenal lesions, with some remarks on partial gastrectomy. J. Am. M. Ass. 9:5 1322-1329, 1924.

TABLE I—CLASSIFICATION

Diagnosis	Cases	Hospital mortality
Gastric carcinoma	113	1
Gastric ulcers		
Chronic and subacute	49	1
Acute perforating	2	
Recurring	7	
Duodenal ulcers		
Chronic and subacute	146	1
Recurring	15	
Combined gastric and duodenal ulcers	13	
Gastrojejunal ulcers	22	1
Carcinoma of duodenum	1	
Sarcoma of stomach	1	
Syphilis of stomach	2	
Benign tumors of stomach	2	
Malfunctioing or unnecessary anastomosis	10	
Miscellaneous (pylorospasm pyloric obstructions and so forth)	17	
Total	400	4
Jejunotomy by		

larly those in which complications either increase the difficulty of interpretation or the risk of operation or both. Care of patients in the hospital before operation is the keynote of the successful management of these cases. The advantages of this preliminary treatment being of particular value for patients with obscure or complicated disorders for patients with recent gastro intestinal hemorrhages, for patients who have had previous (often multiple) operations on the stomach and duodenum for patients with ulcers showing recent exacerbations and extension of inflammatory products for patients with gastric carcinoma for patients with gastric obstruction and retention and in general for patients in poor physical condition. The careful pre-operative preparation of such patients has been of extraordinary aid in determining the indications for surgical procedure the optimal time for it and in making it possible to perform safely difficult technical operations when the surgical risk was great. Equally careful supervision must be maintained during convalescence.

Anesthesia The danger from pulmonary complications following upper abdominal

² Presented at the Clinical Congress of the American College of Surgeons Philadelphia, October 26-31, 1925.

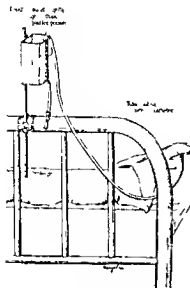


FIG. 4. A simple method of gradually emptying the bladder against a constant pressure.

through the blood stream to the renal parenchyma where in fatal cases multiple small abscesses are discernible at necropsy. During the initial symptoms consisting of a sudden rise of temperature and chills colon bacilli can occasionally be cultivated from the blood stream as pointed out by Cabot. Usually its course is self limited lasting from 4 to 7 days with decreasing rises in temperature. Numerous drugs including mercurochrome, methylene blue, acriflavin and hexamethylenamine have been employed in its treatment but with the exception of hexamethylenamine none has proved generally efficient. The administration of the latter is more satisfactory when given intravenously than orally as doses sufficiently large to produce results will not upset gastric digestion. Mercurochrome given intravenously occasionally yields striking results. The febrile reaction subsides immediately in some cases but in others it is extremely toxic and has even proved fatal so that its routine use is impossible.

Restoration of impaired renal function. The restoration of the impaired renal function sufficient to permit of major operations is naturally the most important aspect of the

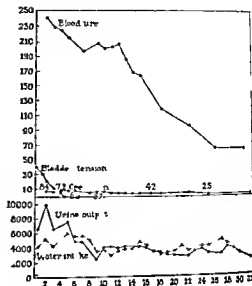


FIG. 5. Chart showing the daily reduction of bladder tension with a corresponding fall in blood urea and creatinin as a result of forced fluid intake which was more than 4,000 cubic centimeters daily.

preparation of patients with prostatic hypertrophy many of whom endure urinary obstruction until the renal function as determined by the phenolsulphonethalein test has reached the vanishing point and the urea content of the blood has reached over 300 milligrams for each 100 cubic centimeters. The establishment of adequate drainage is first undertaken. If the obstruction is complete and acute retention is present great care must be exercised to empty the bladder gradually. To remove a few ounces at a time is dangerous as this immediately reduces intravesical tension and so produces edema of the entire urinary tract. Such edema within the renal capsule results in diminished output of urine and the patient is made worse rather than better. Several methods for the continuous gradual emptying of the bladder are in use the simplest and I believe the most satisfactory being the one described by Van Zwaluwenburg (Fig. 4). By this method the urethral catheter is attached to a long tube filled with fluid and empties into an elevated receptacle at the foot of the bed. The height of this receptacle is determined by the pressure within the bladder and as this gradually

it is nevertheless imperative in view of the enthusiasm of continental surgeons for such radical treatment to investigate its possibilities. Although the operation entails but little more risk than gastro-enterostomy this fact alone does not recommend it and it is doubtful whether the end results will show that it has any superiority over less mutilating procedures. There is already evidence of a reaction against the removal of a large part of a healthy stomach as an indirect method of treating a benign lesion not in the stomach.

TABLE II—OPERATIONS FOR DUODENAL ULCER AND ITS COMPLICATIONS

Types of cases	Cases	Hospital mortality
Partial gastrectomy and duodenectomy	4	
Partial gastric excision (Devine)	4	
Posterior gastro-enterostomy	14 ²	
Antecolic posterior gastro-enterostomy	1	
Excision with or without gastro-enterostomy or gastroduodenostomy	9	1
Disconnection of the anastomosis excision pyloroplasty	1	
Total	161	1

Retention vomiting following gastro-enterostomy is rare since mechanical difficulties are practically eliminated if the operation is indicated the opening is of sufficient size the proximal loop of the jejunum is long enough and the anastomosis hangs well below the mesocolic opening. If regurgitant vomiting should occur it is usually controlled by systematic gastric lavage and if necessary intravenous medication to maintain body fluids.

Gastric ulcer. It is apparent that partial gastrectomy is becoming more and more the operation of choice in cases of chronic gastric ulcer (Table III). The operation is safe and complete removal of the lesion is insured. Another advantage worthy of note is that the removal of multiple ulcers is also insured. These are more common than has been believed and undoubtedly supposed recurrences following excision and gastro-enterostomy have been lesions that were not removed at operation because they were not detected at that time. The tendency of gastric ulcer to become malignant has been shown with such certainty in some of these cases that attempts to depreciate the danger of this tendency are both unnecessary and unwise. It is still not

realized that gastric ulcer is a rare disease, and the frequency with which such a diagnosis is made particularly in women may explain why certain observers believe that only a small percentage of them develop into malignant processes.

While partial gastrectomy is the method of choice in cases of chronic gastric ulcer local excision by knife or cautery combined with gastro-enterostomy remains the most satisfactory and the most reasonable procedure for the small lesion which can be accurately mobilized. Ulcers attached posteriorly should whenever possible be at least detached and the edges of the opening excised or destroyed with cautery since indirect operation alone will relieve symptoms in only a small percentage of cases and the danger of subsequent malignant change is a very real one.

TABLE III—OPERATIONS FOR GASTRIC ULCER AND ITS COMPLICATIONS

Type of case	Cases	Hospital mortality
Partial gastrectomy	29	
Posterior gastro-enterostomy	7	
Excision (knife or cautery) and posterior gastro-enterostomy	18	
Knife excision	1	
Closure perforation and drainage	1	
Anterior gastro-enterostomy enterostomy	1	
Jejunostomy	1	1
Total	58	1

It should be remembered however that gastro-enterostomy alone can be depended on in a certain percentage of cases to promote healing of the ulcer and consequent relief from symptoms. The case of a young woman 27 years of age who had a typical syndrome of gastric ulcer of the hæmorrhagic type illustrates this point. At operation the lesion with a crater 4.5 centimeters in diameter was found on the posterior wall of the cardiac end of the stomach with a broad attachment to the pancreas. It was quite obviously unwise to attempt removal as it would have necessitated almost total gastrectomy and posterior gastro-enterostomy only was performed. Six months later the patient returned the peptic ulcer pain having gradually disappeared. An X-ray examination showed no evidence of a lesion.

Of the 57 cases in this group there were 10 with multiple ulcers and 3 with hour glass

subcutaneous or intravenous administration must be supplemented, preferably the latter, for repeated subpectoral infusions are most trying to the patient and their frequent administration results in costal pain that is most distressing. It has therefore been my practice to give 1,000 cubic centimeters of physiologic sodium chloride solution daily intravenously until the desired results relative to urinary output are attained. If care is exercised the same vein may be employed repeatedly as many as 25 times in succession from 20 minutes to half an hour usually being required in the administration. Under this form of treatment the amount of urinary infection usually diminishes rapidly (Fig 5).

Following the administration of fluid the patient is put daily in a hot pack and a profuse sweat induced. No method has proved as free from danger of burns and overheating as the large electric blanket. The patient can be completely wrapped in this and the current turned off as soon as sweating is initiated. Five or 10 grains of aspirin given just prior to the pack or in refractory cases pilocarpine, is a useful adjunct. Under this form of treatment the urea content of the blood usually diminishes in direct proportion to the duration of the prostatic obstruction (Fig 6). If it has been of long duration 10 milligrams a day is the average amount of reduction; if of acute onset from 50 to 100 milligrams is not unusual. When the urea content of the

blood has decreased to approximately 100 milligrams for each 100 cubic centimeters the advisability of an ultimate one or two-stage operation may be considered.

If the patient tolerates a urethral catheter well the preparation may continue with this form of drainage until the urea content of the blood is below 40 milligrams for each 100 cubic centimeters. If the decrease has been slow and the patient's general condition poor with considerable loss of weight and strength, it is safer to perform a cystostomy and permit him to return home for a few weeks or months as under home environment and food he gains far more rapidly than in the hospital once adequate drainage has been established. The two stage operation has the advantage of insuring considerable diminution in the size of the prostate since after the urethra is put at rest the decrease in edema and engorgement reduces the size of the gland; also the amount of bleeding at the time of operation is much less. However it compels a blind enucleation, a poor surgical procedure bound to be followed by a certain number of inferior functional results.

To undertake cystostomy before the urea content of the blood is below 100 milligrams for each 100 cubic centimeters is to diminish materially the possibility of the patient's recovery as so reduced a renal function will frequently not bear the added load imposed by the operation.

TABLE V—OPERATIONS FOR RECURRING
ULCER AND ITS COMPLICATIONS

	Cases	Hospital mortality
Duodenal ulcer		
Resection	2	
Posterior gastro-enterostomy	11	
Excision and gastroduodenostomy	1	
Disconnection of the anastomosis follow- ing gastro-enterostomy excision of scar pyloroplasty	1	
Gastric ulcer		
Resection	5	
Excision and pyloroplasty	1	
Posterior gastro-enterostomy	1	
Gastrojejunal ulcer (including gastrojeju- nocolic fistula)		
Resection	16	1
Disconnection of the anastomosis follow- ing gastro-enterostomy posterior gas- tro-enterostomy	1	
Disconnection of the anastomosis follow- ing gastro-enterostomy with or with- out excision of ulcer and pyloroplasty	5	
Total	44	1

and duodenum the surgeon is necessarily interested in getting a safe approximation and may therefore not resect the growth as widely as when such a consideration does not enter into the problem. If recurrence does take place it usually occurs in the line of anastomosis probably with resulting obstruction.

It may be of interest that chromicized catgut was employed for all sutures, two rows being placed posteriorly and three anteriorly. Particular attention has been paid to emptying the stomach thoroughly by suction just before the anastomosis is closed.

The relation of carcinoma to ulcer is well shown by the history of a patient aged 55 years who had had stomach trouble for 15 years. The history was typical of peptic ulcer in its periodicity and in the relation of pain to food. Two months before examination at the clinic the patient had vomited coffee ground material and had developed symptoms of partial obstruction. During these 2 months he had lost 20 pounds. Examination of gastric contents showed total acids 70 and free hydrochloric acid 50. A clinical diagnosis of ulcer of the stomach was made. Exploratory operation revealed an ulcer of the posterior wall about 2 centimeters in diameter attached to the pancreas. Resection was performed and the patient recovered uneventfully. The pathologist reported early car-

TABLE VI—PARTIAL GASTRECTOMY

Digesta	Cases	Hospital mortality
Carcinoma	46	1
Gastric ulcer	9	
Duodenal ulcer	4	
Combined gastric and duodenal ulcers	9	
Recurring duodenal ulcer	2	
Recurring gastric ulcer	5	
Gastrojejunal ulcer	16	1
Sarcoma of the stomach	1	
Hypertrophy of the pylorus	1	
Malfunction of the anastomosis following gastro-enterostomy	1	
Total	114	1

cinomatous degeneration. A year later the patient returned having had several months of complete relief from his gastric symptoms but he had recently noticed a loss of weight with loss of appetite. On examination he was found to have multiple carcinomatous nodules on the abdominal wall with ascites and abdominal carcinomatosis.

Recurring peptic ulcer. Recurring peptic ulcer although relatively rare following the proper surgical treatment is nevertheless an important phase of peptic ulcer because of the failure of surgery to bring about permanent cure and because of the difficulties surrounding the cause, prevention, diagnosis and management of the complication. The scope of this paper will not permit any detailed discussion of ulcers of this type, but it should be said that if the primary operation is properly carried out is based on adequate indications and the patients make a reasonable effort at co-operation in their habits of living after the operation, recurrences will be so few that one will hesitate to depart from the methods of surgical management which have been in vogue for so many years. Recurrence may and does of course follow any type of operation including partial gastrectomy. In this series there were 44 operations for recurrences (Table V). 2 of these were at the point of gastro-enteric anastomosis, 7 were in the stomach (6 following gastro-enterostomy and 1 following gastroduodenostomy) and 15 were in the duodenum (7 following a closure of an acute perforation, 4 following an excision of the ulcer and gastroduodenostomy, 2 following gastro-enterostomy and 2 in which the details of the previous operations could not be determined).

risk of the operation and reduce the mortality rate. Willius has recently shown that 42 per cent of patients with prostatic obstruction have cardiovascular disease and that the incidence of cardiovascular disease is higher with prostatic obstruction than with many other diseases during similar decades indicating that co-existing cardiovascular disease is increased by persistent urinary retention.

The causes of death following prostatectomy may be classified in three groups: (1) pre-existing and co-existing organic disease; (2) surgical accidents; and (3) postoperative complications. Group 1 comprises renal insufficiency, cardiovascular disease, chronic pulmonary disease and diabetes. The most common causes in Group 2 are hemorrhage, shock and anasthetics. Group 3 includes pulmonary complications, general sepsis, embolism and peritonitis. Experience has shown that many of these causes of death are preventable. In the early years of prostatic surgery many patients were operated on immediately. Urinary retention due to prostatic enlargement was regarded and treated as an emergency and too often prostatectomy was performed without preliminary examination to determine the physical and organic reserve of the patient. Acute urinary retention may at times not be amenable to other than surgical drainage but prostatectomy is never an emergency procedure. In most instances the careful passage of a urethral catheter is successful and allows sufficient time to ascertain the physical status of the patient and to determine by what means and at what time permanent relief of the obstruction may be considered. In obstructing lesions of the large intestine with resultant toxemia, removal of the lesion is of secondary importance to the relief of the obstruction. Likewise in cases of prostatic obstruction it is primarily important to relieve the obstruction; eradication of the prostate should be considered only after the patient's recovery from the effects of obstruction with stabilization of his physical and organic reserve.

As co-existing renal insufficiency, cardiovascular disease and chronic pulmonary lesions are directly responsible for 50 per cent of deaths following prostatectomy and in

directly responsible for many others due to postoperative complications, their treatment preliminary to operation is essential. Since urinary retention with resultant renal insufficiency and subsequent uremia in cases of long duration directly affect renal function and secondarily enhance co-existing cardiovascular and chronic pulmonary disease, drainage of the bladder forms the keystone of treatment preliminary to prostatectomy.

PREPARATORY TREATMENT

Determination of the time at which prostatectomy may be undertaken with safety depends on the amount of rehabilitation possible in the individual case as indicated by various tests. The phenolsulphonephthalein test of Rowntree and Geraghty and the urea content of the blood are accurate indexes of renal function and relatively easy of conduct and interpretation. The salivary urea estimation according to Hensch and Aldrich has simplified the determination of urea retention and affords accurate measurement of renal insufficiency with the simplest of laboratory equipment. Estimation of renal function determines the amount of renal damage incident to retention acts as a guide to the time at which operation may be considered with safety and serves as a relative prognosis for recovery and post-operative life. These tests of renal function require repetition at frequent intervals during the period of pre-operative treatment to permit accurate interpretation of the effects of treatment. Except under most unusual circumstances preliminary treatment should be continued until the reactions to the renal functional tests have become stabilized within or near normal limits. It is only through the employment of these tests that the time may be accurately determined at which operation may be carried out with the minimal risk.

Electrocardiographic studies in conjunction with clinical investigation of the cardiovascular system has become routine in the determination of the status of the patient with surgical prostatic obstruction. The electrocardiogram makes the diagnosis of cardiovascular change approach an exact science facilitates estimation of the cardiovascular reserve and serves in making a relative prognosis.



Fig 3



Fig 4



Fig 5

Fig 3 Hyperthyroidism in child 9 years of age. Mother had hyperthyroidism. Child had pus in urine and was treated for urine infection for 8 months; this was followed by bulging of the eyes and enlargement of the neck; dyspnea on slight exertion; pulse 130. Very ill after thyroidectomy.

Fig 4 Hyperthyroidism in child 10 years of age. Child always nervous and irritable; had slight difficulty in speech; thyroid enlarged with bruit and thrills; nervousness, tachycardia, emaciation, exophthalmos developed

9 months after symptoms were first noted. Interval of 3 months between ligations and between second ligation and lobectomy. Every operative procedure followed by marked reaction.

Fig 5 Hyperthyroidism in child 9 years of age. Soft bilateral enlarged thyroid with thrills; nervousness, marked tremor; pulse 140; exophthalmos had been present for 1 year before examination. Bilateral ligation of the superior thyroid artery and thyroidectomy were followed by marked reaction.

in children could be attributed. Climenko reports a series of cases in one family in which the mother, two daughters, and a child of each of the daughters, one a boy and the other a girl, had the disease. The mothers of 8 of our own patients had had goiters, and in at least two instances hyperthyroidism had also been present. In the case of one of the mothers who had shown symptoms of hyperthyroidism, the goiter had developed during pregnancy. In 2 of the cases in which the history states that the mother had had a goiter, the fathers had also had goiters; one of them being of the exophthalmic type.

Klein reports 3 cases in which hyperthyroidism followed the removal of tonsils, and Wheelon reports the case of a child of 4½

years in whom exophthalmos with status thymolymphaticus followed varicella and mastoiditis. Prominence of the eyes developed rapidly during the attack of chicken pox, and the typical syndrome of hyperthyroidism followed. In only a few of our cases is there any history of a directly antecedent infection. In 1 case the patient when 3 years old had had an attack of whooping cough accompanied by very marked convulsions. Soon after this attack a bilateral exophthalmos with tachycardia developed and these symptoms persisted until the child was brought to us at the age of 7 (Fig 1). In another case a girl of 9 years a bilateral exophthalmos appeared 3 weeks after an attack of scarlet fever. In 2 cases there was a history of tonsillitis in 1 of

demonstrable renal insufficiency and were considered good surgical risks without preparation

A review of the clinical course and necropsy findings obtained in 85 per cent indicates that 50 per cent of the deaths were due to pre-existing and co-existing disease that is cardiovascular renal disease and pulmonary lesions 4 per cent were due to surgical accidents that is hemorrhage and shock 46 per cent were due to postoperative complications such as pulmonary complications general sepsis embolism, and peritonitis Seventy five per cent of the deaths occurring in that group of patients considered the best surgical risks by virtue of small amounts of residual urine no demonstrable renal insufficiency and so forth and the operation of prostatectomy undertaken without preliminary treatment were due to the causes enumerated under Group 1 Thirteen deaths from postoperative complications were due to pulmonary embolism, 11 patients dying from this cause had been considered excellent surgical risks and were operated on without preliminary treatment That the occurrence of pulmonary embolism bears a distinct relationship to lack of preliminary treatment is beyond question

In the group of 437 patients (24.5 per cent) who had had preliminary cystostomy the mortality rate was 7.5 per cent for the subsequent prostatectomy 666 (37.3 per cent) received no preparation and the mortality rate was 6.6 per cent 680 (38 per cent) had been prepared by urethral catheter drainage and the surgical mortality rate was 3.2 per cent In other words the mortality rate following prostatectomy on the best surgical risks without preparation approaches closely that of the

exceedingly poor risks requiring cystostomy and is twice that following preparation of patients by urethral catheter drainage

The necessity for preparation in all cases is apparent and successful management demands drainage of the bladder preliminary to prostatectomy for at least 10 days often for longer periods This has recently been accomplished by permanent urethral catheter followed by the one stage visualized suprapubic prostatectomy in 80 per cent of the cases

The adoption of this principle of management in all cases has resulted in the removal of the prostate gland in 204 cases at the Mayo Clinic during the present year with but 3 deaths, in 172 consecutive cases of which the one stage operation was employed with but 1 death

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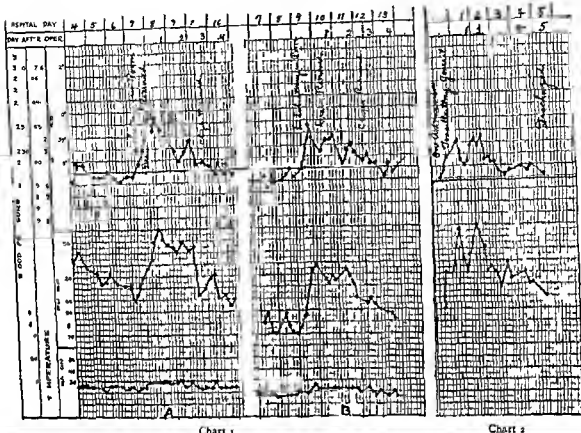


Chart 1

Chart 2

Chart 1 Chart showing reaction following successive lobectomies. A (left) First lobectomy B Second lobectomy 5 weeks later

Chart 2 Chart showing severe reaction following tonsillectomy performed in the presence of hyperthyroidism in child 13 years old

The highest pulse rate observed in our series was 162 the average for these cases being 125

So far as we have been able to note the mentality of these children has been normal for the age an observation which is in accord with that of Klein

A study of recent literature pertaining to the determination of basal metabolism in children shows a considerable divergence of opinion as to what may be considered the normal rate for different pre adolescent and adolescent ages One of the most recent studies is that of Cameron who has reported an investigation extending over 3 years as the result of which he concludes that the results by Benedict and Talbot on the basis of body weight are too low for the children of Winnipeg He attributes this difference

to the type of machine used and to the possibility that a climatic factor is involved Benedict advises that estimations of basal metabolism in children be made on the basis of height rather than weight Cameron used weight in his estimations of all pre adolescent children As stated by DuBois it is obvious from the variations in the findings of these observers that much more work on the subject is needed In view of the difficulties of controlling children especially the hyper excitable child with hyperthyroidism and of the present uncertainties as to the best method to employ it is obvious that estimations of the basal metabolism in children should be interpreted on the basis of normal estimations secured by the same observer

The treatment of hyperthyroidism is the same whether the patients are children or

the consequence of this detoxication of the products of abnormal protein catabolism. Glucose too acts as a diuretic and its value in the treatment of toxæmia resulting from biliary retention has been described by Judd and Burden.

Should acute retention of urine in the bladder occur the necessity for withdrawing the urine gradually is apparent since its sudden removal may be sufficient to cause suppression of urine. The relation between the circulatory pressure and urinary pressure may be disturbed by alteration of either. The renal blood pressure may be reflexly affected by vasomotor influences from the rapidly relieved bladder the urinary pressure in the tubules may be suddenly altered with release of the excessive pressure in the bladder. If the alteration in the relative pressures on the two sides of the secreting renal cell is sudden enough and profound enough suppression will result. In addition the change of the relative pressures on the two sides of the secreting cell is likely to inhibit the function of the cell. The same principle applies in the relief of biliary obstruction. Crile has shown the advantages of slowly relieving the pressure in an obstructed biliary tract by allowing only a gradual escape of bile through the drainage tube. In biliary obstruction resulting from a malignant neoplasm at the head of the pancreas anastomosis of the gall bladder and the intestine which permits only a gradual release of the obstruction achieves results far superior to those obtained by external drainage such as cholecystostomy in which the pressure is quickly and suddenly relieved.

With the gradual relief of the obstruction whether spontaneous or induced improvement in the patient's general condition is at once apparent. Coincidentally antibodies apparently appear which increase the resistance of the patient. It is a fact that operations performed on debilitated patients in whom improvement has begun are attended with as little risk as though complications had not appeared. The appearance of the patient and his opinion as to the condition of his health usually indicate when improvement begins. Also the phenolsulphonephthalein

test of Rowntree and Geraghty and an estimation of the amount of urea in the blood give accurate information concerning the functional capacity of the kidneys. Should the condition of the patient be such as to increase the risk of surgical procedure then the usual methods of restoration suffice in most instances to prepare the patient for a safe operation.

In order that there may be the smallest possible residue of nitrogen the diet should consist for the most part of carbohydrates with a minimum of protein and fat. Although 60 per cent of protein can be metabolized by the body into glucose the process leaves a residue of nitrogenous by-products which may accumulate in the tissues and in the blood and place additional strain on kidneys the function of which is already unbalanced as a result of obstruction and infection in the urinary tract.

Cabot has said that infection does not develop in a previously clean bladder following catheterization until overdistention from urinary obstruction occurs. With prostatic obstruction the patient is usually unable to empty the bladder entirely and the resultant accumulation of residual urine forms an excellent culture medium for bacteria. For this reason it is essential during the preparation of patients with hypertrophy of the prostate in the presence of urinary infection to see that the bladder is kept entirely empty either by means of an indwelling urethral catheter which can be satisfactorily used in 75 per cent of cases as shown by Hunt and Bumpus or by means of suprapubic cystostomy.

The pre-operative treatment of patients with benign hypertrophy of the prostate has materially assisted in the reduction of the mortality rate of prostatectomy. In 204 consecutive operations for prostatectomy performed between January 1 and October 1, 1925 by Hunt and myself there were three deaths one of which occurred from facial erysipelas on the thirtieth day following the prostatectomy from causes entirely remote from the operation. For the most part prostatectomy was suprapubic with the exception of approximately 10 per cent of my own case.

THE CARE OF THE HANDICAPPED GOITER PATIENT¹By ROBERT S. DINSMORE M.D. CLEVELAND OHIO
Clev. L. & Ch. ac

IN considering methods for the rehabilitation of handicapped goiter patients one should have clearly in mind the groups of cases in which operation is peculiarly hazardous and the fact that whatever the type of case the same general measures for restoration and conservation are in the main effective. The groups of goiter cases in which the hazard of operation is especially marked are first cases of hyperthyroidism in adults in whom symptoms of the disease are outspoken and of long standing second all cases of hyperthyroidism in children third cases of adenomata in elderly patients with or without hyperthyroidism, and fourth cases of large intrathoracic goiter.

The principal conditions which contribute to the risk which attends hyperthyroidism are (1) marked loss of weight within a short period of time (2) myocardial changes (3) dehydration and impending acidosis and (4) instability of the nervous system. Each of these conditions in itself suggests the method of rehabilitation to be employed. Thus the excessive metabolism which has resulted in the rapid loss of weight demands absolute rest in bed with control of the hyperactive nervous system by sedatives. Dehydration and impending acidosis with the attendant vomiting and diarrhoea are met by the administration of large quantities of fluid which we prefer to give by means of the subcutaneous infusion of normal saline to which novocain has been added as suggested by Bartlett. When delirium develops in a patient with acute hyperthyroidism we are confronted with one of the most difficult problems encountered in this disease. The transfusion of whole blood is a very effective remedy and often results in immediate improvement and we have had instances in which the patient became rational following the transfusion. In some of these cases however a true psychosis may develop if that occurs a guarded prognosis should be made both as regards the risk of operation and the ultimate result. In such cases I feel that a minimum period of 2 months should

elapse before any operative procedure is undertaken.

To protect the myocardium digitalis is given before operation to patients in whom myocardial changes have developed—a measure which was first proposed by Dr. Frank Gibson in 1920. It should be borne in mind that in many cases of hyperthyroidism there has been persistent tachycardia for a long period of time with resultant hypertrophy and dilatation of the heart and that these cases are especially subject to auricular fibrillation. It should be emphasized however that digitalis cannot control tachycardia and that massive doses of digitalis should not be given. Patients who have received pre-operative treatment with digitalis have a much smoother postoperative cardiac convalescence and are certainly less apt to develop postoperative auricular fibrillation. While it is quite true that patients may have postoperative auricular fibrillation without any further cardiac embarrassment nevertheless I am always anxious in such cases inasmuch as some of the patients develop a dilatation of the heart. Our routine method is to give 30 minims of the tincture of digitalis every 4 hours for 6 doses, so that the patient receives 180 minims during a period of 24 hours.

Lugol's solution has proved to be an extremely important addition to the preparation for operation of patients with true exophthalmic goiter of the hyperplastic type and we are indebted to the Mayo Clinic for having brought this measure to our attention. As a result of its use we have been able to perform thyroidectomies as a primary operation in many cases which otherwise would have required preliminary ligations. There are certain points regarding the use of Lugol's solution however which should be considered. Early in its use it was frequently noted that patients appeared to be in better condition than was actually the case as has been pointed out by Lahey so that it was found to be inadvisable to operate at the time of the

the consequence of this detoxication of the products of abnormal protein catabolism. Glucose too acts as a diuretic, and its value in the treatment of toxæmia resulting from biliary retention has been described by Judd and Burden.

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they would recur on successive days so that the dose of magnesium sulphate had to be repeated. We now use a parathyroid extract prepared according to the method developed by Professor Collip of the University of Alberta which has proved to be a specific in the treatment of this condition. Only one or two intramuscular injections of 1 cubic centimeter each of the parathyroid extract is sufficient whereas large and repeated doses of magnesium sulphate are required. Moreover we have found that parathyroid extract has been equally effective in the treatment of some cases in which the tetany had persisted for a number of years and strange to say in both

acute and chronic cases there has been no reduction in the calcium content of the blood.

CONCLUSION

In conclusion it is my belief that by the employment of absolute rest in bed with sedatives of large quantities of fluid of blood transfusions especially in delirious patients of Lugol's solution of guarded doses of digitalis, of local anaesthesia, with light gas oxygen anaesthesia or analgesia of a multiple stage operation performed in the patient's room, the handicapped goiter patient has the advantages of manifold measures for his protection.

THE REHABILITATION OF THE CARDIOVASCULAR PATIENT¹

By FRANK H. LAHEY, M.D., F.A.C.S. AND BURTON E. HAMILTON, M.D. BOSTON, MASSACHUSETTS

OUR experience with reconstruction of patients with chronic cardiovascular disease has been gained purely from clinical effort to relieve or delay disability of individual patients. We have not adopted any particular therapeutic agent and applied it universally.

Cardiovascular disability of course includes in its great variety of disorders some conditions which require or suggest a specific treatment for example special drug treatment of the patient with auricular fibrillation and rarely other more dramatic measures such as removal of the cervical sympathetic ganglia, periarterial sympathectomy, embolectomy and resection of the ribs over a grossly enlarged heart.

In the majority of cases however chronic cardiovascular disease is determined by a fixed end result pathology not to be directly approached. Treatment is forced toward removing coincident burdens such as weight reduction of the obese, removal of evident foci of infection and adjustment of habits, drugs, diet, hygiene and living conditions. We feel that adequate care of the patients demands an individual treatment based pri-

marily on direct personal diagnosis, laboratory diagnosis alone and routine treatment being insufficient.

We realize that our enumeration of these well known therapeutic considerations may appear like platitudes and risk the obvious inadequacy of this introduction to the vast subject of reconstruction of patients with cardiovascular disease in order to avoid the impression that we overvalue the single important new point of view that our experience has brought us that is the removal of coincident surgical burdens.

We wish to stress particularly the operability of these patients. They may be operated upon under certain conditions with surprisingly low mortality.

Of 136 cases with serious rheumatic heart disease personally examined by us and followed through major surgical operations (partial thyroidectomies, abdominal section and herniotomy) 6 died. The group includes a majority with mitral stenosis, a fair number with aortic regurgitation or both of these lesions, 31 with auricular fibrillation and 36 with clear evidence of decompensation. One death only occurred in 87 operative cases of

The determination of the patient's condition prior to operation and the restoration of patients handicapped as a result of obstruction of the urinary tract have assisted greatly in reducing the mortality rate of prostatectomy. Whether the operation is to be performed in one or two stages suprapubically or perineally is dependent on the general condition of the patient, the pathological condition of the urinary tract and the experience of the surgeon for what in the hands of

one is a safe operative procedure with little possibility of postoperative complications in the hands of another becomes an operation of necessity rather than of choice.

In general, after preliminary preparation for operation if the condition of the patient is such as to permit safe prostatectomy it makes little difference from the standpoint of mortality rate whether the gland is removed through a suprapubic or a perineal incision.

THE USE OF INSULIN IN SURGERY AND OBSTETRICS

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THE service rendered to the handicapped surgical patient by the work of that great Canadian, Frederick Banting, can never be measured in words nor can the gratitude of the diabetic ever be sufficiently expressed.

The diabetic patient is remarkably liable to the development of complications many of which require surgical treatment. In the past he has been considered a bad surgical risk. As a result of the disordered metabolism the tissues do not heal readily and at the same time lend themselves more easily to infection. Operative procedure and the anesthetic both aggravate the diabetic state and may convert a mild case into one of coma. With adequate pre-operative and postoperative treatment carried out under insulin administration these dangers can to a large extent be avoided. It is perhaps still true that from a statistical standpoint the diabetic is a poor surgical risk. A large group of diabetics are well on in years and besides this they show premature degenerative changes especially arteriosclerosis and myocardial disease. Exclude this type of case and it may be said that under careful control diabetes does not materially increase operative mortality.

In the preparation of the diabetic patient for operation various disturbances of metabolism are to be considered: hyperglycemia, dehydration, ketosis, acidosis, undernutrition

and depletion of the carbohydrate stores. Any of these disturbances may be present to a degree which if not relieved may seriously endanger the patient preparing for operation.

The importance of a normal blood sugar level is now generally recognized. It is desirable to allow several days when possible for the determination of the severity of the diabetes and the required amount of insulin to maintain a normal blood sugar level while the patient is on a suitable diet. In emergency operations however this preparation cannot be carried out but in such cases maximum amounts of insulin should be administered during the time that may be available before operation for the purpose of reducing the blood sugar level. In this way the liability to postoperative complications will be much reduced and this is especially true with surgical infections such as the diabetic carbuncle in which reduction of blood sugar will lessen the danger of postoperative pyemia or multiple abscess.

If there has been much glycosuria it is likely that dehydration has taken place. This becomes early manifest in the increasing thirst of the patient and later by the dry tongue and skin and finally by the soft eye. It is to be remembered that such a patient may have lost more than 5 per cent of his body weight and that 3 or 4 liters of fluid may well be given for 2 or 3 days when well marked signs of dehydration are present.

to believe that the severely disabled patient with cardiovascular disease is a good risk in routine surgery. These fragile patients deserve elaborate preoperative care and in spite of the most painstaking preparation a definite number will die unexpectedly and suddenly. The first essential is accurate diagnosis of the cardiovascular condition. We have routinely used indirect methods of diagnosis: urinalysis, kidney function tests, blood chemistry, cell counts, blood pressure examination of the eye grounds and so forth. We believe them, however, to be but adjuncts of clinical diagnosis and do not feel that they should be allowed to be the uncorrelated basis for determining operability of patients. We do not believe that any formula based upon these indirect tests will adequately express operability.

Similarly, study of the heart by graphic methods has its direct value as an aid to diagnosis but does not occupy a prominent place in determining operability. Indirect tests for cardiac function with which we have had considerable experience do not appear to be of great value in this connection.

From our experience, nothing can supplant direct personal diagnosis and daily supervision in estimation and control of dangerous cardiovascular risks. For example, the signs and history of gross congestive heart failure are sometimes confusing, may readily be overlooked and can only be discovered by careful direct examination and history taking. Operating within 3 weeks of a congestive failure (even though of brief duration) is something to be avoided if possible from our experience. Though we have operated successfully in many cases when signs of congestive failure were still present and on a small number of patients who had chronic failure of the an-ginal type, the time has been chosen only when prolonged medical care showed the

patient to be at his best in terms not only of laboratory tests and of physical signs but general welfare as shown for example by the character of the respiration, sleep and absence of anxiety. Though we have avoided routine digitalization, proper digitalization of patients with auricular fibrillation and associated rapid ventricular rate can readily be shown to reduce cardiovascular disability. Thus and, rarely, other disorders of the heart are sometimes overlooked at routine surgical examinations. Although routine electrocardiographic tracings will determine the diagnosis in most but not all of these disorders, for example, *pulsus alternans*, the condition of the patient who has disorderly heart action only in attacks can be discovered solely by direct and continued observation.

SUMMARY

To summarize, we wish to direct attention to the occasionally indicated method with which we have succeeded in rehabilitating patients with cardiovascular disease by indirect surgical measures. This consists in the removal of surgical burdens. The order of the greatest degree of accomplishment is removal of the toxic goiter, removal of large pelvic tumors and removal of troublesome gall bladders.

In view of our low mortality with this type of case, we urge that patients of this group who have coincident and burdensome surgical lesions after proper consideration and preparation by rest and partial or complete restoration of compensation be operated upon and relieved of such lesions. It has been our experience that if there is co-operation between cardiologist, anæsthetist and surgeon, not only will the mortality in this seemingly hopeless group be surprisingly low but the degree of restored ability in many cardiovascular cases will be strikingly high.

THE PREVENTION OF DISEASE

A TRIBUTE TO DR MURPHY¹

By SIR W ARBUTHNOT LANE Bt MS FRCS LONDON ENGLAND

INTRODUCTION BY RUDOLPH MATAS MD LL D

President of the American College of Surgeons

AVAILING myself of the agreeable privileges that are accorded me by my official position I am happy to extend a hearty welcome in behalf of the College to the eminent representative of British surgery whose name and fame are known wherever the language of surgery is spoken, Sir Arbuthnot Lane

Sir Arbuthnot has come from overseas to deliver the Murphy Oration and to join us in annual tribute to the memory of one of our illustrious founders whom the world justly recognizes as one of the most brilliant exponents of American surgery. Apart from his mission and his message the presence of Sir Arbuthnot in our midst is a signal for an enthusiastic manifestation of pleasure and approval. Sir Arbuthnot's frequent visits to this country, his long known and tried friendship for Americans and American institutions and his generous and unfailing hospitality and kindness to all American surgeons who have flocked to his clinics at Guy's Hospital London suffice at all times to assure him of a cordial reception.

To those of us who have enjoyed the privilege of seeing him at work in his operating theater at Guy's it would be superfluous to speak in his praise. Those who have not been so fortunate know his merit in their own work for it is through his original teachings and example that one of the most fruitful advances in modern surgery has been accomplished.

Many years ago when the study and teaching of human anatomy was my chief preoccupation I learned to admire him through his published writings as a master of that fundamental branch of surgical knowledge in which the British school has excelled and still remains as a model and an unchanged inheritance in our class rooms. Later when I came in contact

with him I was not surprised to find a surgeon whose courage and daring were only surpassed by his originality, resourcefulness and skill. In one day I saw him do a difficult palatoplasty for cleft palate, a resection of the lower jaw, an open reduction and plating of both bones of the forearm for fracture and a resection of the colon for what is now known as Lane's disease, upon all of which he stamped the seal of his personality by the originality of his methods and the smoothness, ease and perfection of technique that proclaimed him a great master—a master who dared where others quailed and who succeeded where others would have failed without his skill, his precision and the discipline and method with which he planned his operations.

Sir Arbuthnot Lane is one of those rare surgeons who knows no limit to the anatomical territory in which he can exercise his art. He is as much at home in the extremities as in the head and trunk, in the bones and joints as in extirpating a colon, in doing an ileosigmoidostomy as in ligating and excising an internal jugular to stop an otitic infection on its fatal way to the lungs.

In this extraordinary versatility, we recognize a close analogy to the creative and technical genius of Murphy. In both the mind in conception of ideas and the hand with the cunning of the craft are united in harmony to attain great objectives, to open new and untrodden paths. In both the craft of the artisan is inspired and guided by the imagination of the artist.

Murphy invented that marvel of mechanical ingenuity the 'Murphy button' which gave a new impetus to intestinal and abdominal surgery. But more than this he later conceived a new pathology of septic peritonitis and by his original methods of treatment robbed this most formidable of surgical complications

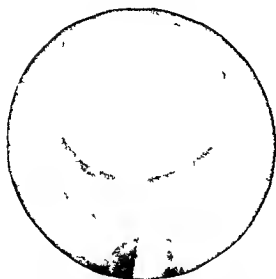


Fig 1 Cystogram of bladder in which prostatic obstruction has been of only short duration. There is no elevation of the base of the bladder and but little irregularity of the bladder outline

tected on physical examination. Such cases are best treated by removing only the obstructing portion of the gland. This can be most efficiently done by means of the punch operation through the urethra as the recent improvements in instruments makes possible the removal of much larger amounts of tissue than in the past. Recently we have used this operation in fully a third of our cases of prostatic hypertrophy and Caulk reports that he uses it in as high as two thirds of his cases.

The third cause of symptoms out of proportion to the physical findings is prostatic infection. Infection by increasing the size of the gland allows the accumulation of sufficient residual urine to increase the infection still further and so a vicious circle arises. In infected cases removal of the obstructing portion of the gland by means of a punch operation permits of complete emptying of the bladder and thus the infection is rapidly reduced. The performance of a radical operation often so activates the infection that the seminal vesicles and surrounding structures become extensively involved in a very acute process which of course produces symptoms of dysuria and frequency as marked as those from which the patient sought relief.



Fig 2 Cystogram of bladder in which prostatic obstruction has been of several months duration. Note the irregularity in the bladder outline and multiple cellules the result of long continued intravesical pressure

Care and treatment of associated infection
 Pyelonephritis is the most common form of infection complicating the preparatory treatment for prostatectomy. Usually of urethral origin it is carried from the prostatic urethra



Fig 3 Cystogram of bladder in which obstruction has been of long duration. Cone-shaped deformity of dome characteristic of urethral obstruction of long duration easily mistaken for diverticula

early in 1894. Learning of this Dr Murphy, accompanied by his beautiful wife called to congratulate me on the result I had obtained by the use of his most ingenious and useful device. How many lives that button has saved and how much it has stimulated surgeons to improve their technique is well known to us all. It proved to be one of the greatest advances in abdominal surgery. There are still conditions in which no other method can approach the Murphy button in usefulness. Up to that time the name of Murphy was practically unknown on our side of the water. Our friendship dated from that visit and I have always regarded it as a very great privilege to have since had many opportunities of discussing surgical problems with one with whom I was entirely in sympathy. He was always so ready to take an active interest in any new problem on which his fertile and imaginative brain invariably cast some fresh light. He was essentially an original man as well as being a superb teacher. I know as do so many of his intimate friends how much Murphy owed to the constant care and devotion of his charming helpmate who seemed to possess the secret of perennial youth. While unable to control his indomitable will in the pursuit of science she did her utmost to provide him with the care and attention necessary to enable him to continue his arduous occupation. Not only did she look after his health but she took a very active share and interest in his surgical work. Although many years have elapsed I can vividly remember her description of the manner in which the button was evolved and the anxiety and interest with which they both watched the result of its use in animals before employing it in the human subject. Her love and care played no small part in making Murphy's career the great success it was.

What struck me most in Murphy was his wonderful generosity, a quality which is so largely shared by other great American surgeons. He was always most anxious to accord praise to others wherever it was possible and often avoided claiming for himself much original investigative work.

The excellence of his surgical work appealed to everyone as did also his remarkable breadth of vision and his foresight.

He possessed in a peculiar degree a power to hold and hypnotize his audience beyond that of any other surgeon I have met. He appeared to take possession of his hearers and to imbue them with a feeling that whatever he said was true.

Few of us will forget his operations and his demonstrations in his theater. Genuses of the type of Murphy are not teachers in the ordinary sense in that they do not produce the like among their immediate entourage but on the other hand they exert an immense and wide spread influence on the whole community. That was essentially the case with Murphy.

I spent much time with him in that memorable conference in 1914 of which he was the distinguished president and when we had many conversations about chronic intestinal stasis in which he took a very active interest and for which he foretold a great future. At that time not only did few people accept my views on this subject but the bitterness of the attacks of many members of our profession was characteristic of their usual attitude toward any ideas with which they were not familiar. Murphy was infinitely more practical. He saw a large number of my cases both before and after operation. He was present at many operations and he investigated the histories of these patients in his usual thorough manner. He was one of those who accepted my views and gave me his hearty encouragement for which I was most appreciative and grateful. I am also glad to remember that he took precisely the same attitude when the operative treatment of simple fractures was being opposed in the usual acrimonious manner.

I trust that you will not think me egotistical if I read to you a portion of Dr Murphy's last letter to me which I need not say gave me very great pleasure. It is characteristic of him.

My dear Colleague I have still greater feeling of gratitude to you for your contributions to the Congress in so many ways. Your indefatigable zeal in your clinics made you the ideal busy surgeon of the world. You cannot comprehend how much you have endeared yourself to the American medical profession by your work during the Congress. The doctors are returning now and every day I hear comments on your work. Surely your ears must often burn as they are so sincere in their praise of you. I feel that in doing this work you were paying a personal

TABLE I—BFD SIDE RECORD SHOWING THE GRADUAL REDUCTION OF BLOOD UREA BY THE DAILY INTRAVENOUS ADMINISTRATION OF PHYSIOLOGICAL SODIUM CHLORIDE SOLUTION TWENTY FIVE CONSECUTIVE INJECTIONS WERE MADE INTO THE SAME VEIN

[illegible]

diminishes as a result of overflow the receptacle is lowered. Usually from 3 to 4 days are sufficient for complete emptying. After the bladder is emptied the elimination of the retained toxic substances throughout the body is accomplished by the giving of large amounts

of fluid and their elimination by sweating, purgation, and diuresis. A careful record must be kept of the fluid intake and output, a minimal output of 2 500 cubic centimeters being imperative. If this cannot be maintained by the oral administration of fluids

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TREATMENT OF THE SURGICAL PATIENT HANDICAPPED BY URINARY OBSTRUCTION¹BY VERNE C. HUNT, M.D., F.A.C.S., ROCHESTER, MINNESOTA
D. of S. 17 May Ch.

BELFIELD, in 1890 reported a series of 133 cases from this country and abroad in which the prostate had been radically removed. He compared mortality rate and ultimate functional results in the suprapubic and perineal methods of removal. Forty one of the operations were by the perineal method with a mortality rate of 9.7 per cent, 88 were by the suprapubic method with a mortality rate of 13.6 per cent. 4 were by the combined method. Restoration of voluntary urination was equally satisfactory following either method but occurred in only 71 per cent of the cases. The relatively high incidence of failure of the radical operation to restore voluntary urination may be explained on the basis of incomplete removal of all obstructing portions of the gland in many instances only the median lobe was removed. Lowsley's embryological studies correlated with Wilson's and McGrath's work on the pathology of benign prostatic hypertrophy are supported by clinical experience in showing that prostatic hypertrophy is not confined to the median lobe but occurs at least as often in the lateral lobes with or without involvement of the median lobe. Removal of the lateral lobes when hypertrophied ensures the elimination of all obstructing prostatic tissue and with the improvement of surgical procedures good ultimate functional results have increased following both the perineal and suprapubic methods of prostatectomy. That unmistakable progress has been made in the perfection of both methods is attested to by the total restoration of voluntary urination after either method as conducted for benign hypertrophy today. While the perineal operation was accompanied by a lower mortality rate in the earlier years of prostatic surgery improvement in the suprapubic method has apparently eliminated this difference.

Numerous arguments have been presented since Belfield's original report setting forth

the advantages and disadvantages of the perineal and suprapubic methods. However an unprejudiced analysis of the ultimate functional results and mortality rate following both methods of operation by those experienced in them shows that these indexes of merit can no longer be utilized to discredit one or the other method.

Deaver has shown that the average mortality rate from prostatectomy performed by the occasional or inexperienced operator in this field of surgery is between 20 and 30 per cent. Such a high mortality rate seemed to justify the investigation of the causes of death, an analysis of the factors influencing lethal effect and the presentation of means of prevention.

In the early years of prostatic surgery little was known of the effects of prostatic obstruction. No methods had been devised for measuring those effects and no therapeutic means were available for obviating them. However investigation has resulted in reliable tests of renal function and experience has taught their application so that more or less standardized methods have been devised for the more successful management of the patient with prostatic obstruction. Experience has also taught that adequate management embraces more than surgical removal of the gland. As Bugbee has said, "Removal of the prostate gland is but an incident in the treatment of prostatic obstruction."

Since prostatic obstruction occurs most commonly between the ages of 60 and 75 years far beyond the average age for surgical conditions the patient must be considered a substandard risk not only because of his age but because of the coincident cardiovascular changes and the renal insufficiency incident to urinary retention. Recognition of these conditions has led to methods of preparation for prostatectomy to enhance the patient's physical and organic reserve which lessen the

up to Chicago you find that while they have been freed from the infective conditions to which they were exposed in their native surroundings they have steadily acquired the diseases of the gastro intestinal tract and the conditions consequent upon them in a degree directly proportional to the state of civilization in which they exist. When the conditions and circumstances in which they live become identical with those of the white man the incidence of the diseases of civilization is exactly the same in the negro as it is with us.

Can anything be clearer than the evidence afforded by this experiment which can be repeated over and over again in the various portions of the globe?

Let us consider what are the differences in the food and habits which have produced such a disastrous change in the health of the native.

In normal conditions the native baby depends entirely on the mother for its food, since there are no artificial substitutes available. The period of lactation is very prolonged so much so that the child discards the breast only when he begins to take the normal food of its parents.

In civilization the cessation of the napkin stage is followed by an enforced state of constipation for at least 24 hours since it is considered by white races that a single action a day is sufficient for health.

The native on the other hand continues the habit of emptying the colon after each meal throughout the whole of his subsequent career, consequently the intestines act naturally in response to the normal stimulus and for that reason undergo no abnormal change in their structure during the individual's lifetime.

In civilization the enforced accumulation of at least 24 hours contents in the terminal segment of the large bowel results in a tendency to its progressive elongation and distention. Because of the inconvenience such a result would produce nature endeavors to control and prevent this elongation and dilatation by fixing the bowel by acquired bands or membranes which at first secure and shorten the mesentery and later grip the bowel fastening it immovably to the floor of the iliac fossa and rotating it on its longitudinal axis. By this the lumen of the bowel is obstructed

and material is dammed back in the proximal segments of the colon. The portion of the bowel which is anchored ceases to function normally and becomes inflamed so that the passage of the intestinal contents through it is progressively impaired. If the patient has bernal protrusions or diverticula may form in the bowel proximal to the obstruction a condition the causation of which I described in 1883. Finally the chronically inflamed and irritated segments not infrequently develop cancer.

A quarter of a century has elapsed since I described the mode of development of this acquired obstruction, the first and last link and called the attention of the profession to what I believe to be by far the most important evolutionary structure in the human body which has ever been observed and one that is productive of the most disastrous consequences. It is a regular Pandora's box.

I was led to the discovery and appreciation of the importance of this new development by a study of the changes which the body undergoes when its mechanical relationship to its surroundings is altered from the normal.

I found that the human anatomy bears a simple mechanical relationship to its surroundings and varies definitely and rapidly with any change in that relationship. This I demonstrated in the clearest manner possible in the dissecting room of Guy's Hospital by the examination of the dead bodies of laborers who had been engaged during their lifetime in various arduous occupations. A careful investigation of the changes which their structure underwent in consequence of the special functions performed proved to be so characteristic so definite and so precise that from an examination of the anatomy of these workers one was able to determine with absolute accuracy the labor history of the individual or in other words the functions he performed habitually during his lifetime.

The laws which I have formulated as governing these changes are quite simple and can be readily understood by a study of these labor conditions. They are

- 1 The skeleton represents the crystallization of lines of force

- 2 Pressure produces definite changes

Careful physical and roentgenographic examination of the lungs may disclose chronic pulmonary lesions notably chronic bronchitis bronchiectasis emphysema and so forth which predispose to acute postoperative exacerbation and pulmonary complications

In the evolution of suprapubic prostatectomy it was a common observation that patients who had survived simple cystostomy for retention or for removal of vesical calculi and had recovered from the depression subsequently underwent radical removal of the prostate gland with a relatively low mortality rate. This gave impetus to the two stage prostatectomy which is yet indispensable when there are associated vesical lesions severe cystitis marked renal insufficiency senility intolerance to the urethral catheter and trauma of the urethra. Prostatectomy simultaneous with removal of large vesical calculi and excision of large diverticula in the presence of marked cystitis is accompanied by a higher mortality rate than the two stage operation. In my experience less than 6 per cent of patients are intolerant to drainage by the permanent indwelling catheter and require cystostomy. The two stage operation is necessary in certain cases to ensure the minimal risk but that it deserves adoption as a routine is questionable. Excellent drainage of the bladder is facilitated through permanent urethral catheterization in most instances and limits the surgical procedure to one operation which permits exposure visualized conduct of the operation and accurate hemostasis so necessary to the best functional results and avoidance of surgical accidents. Employment of the method of gradual decompression as described by Van Zwaluwenburg has often obviated the necessity for preliminary cystostomy.

That drainage of the bladder is the most important factor in preliminary treatment does not necessarily mean that cystostomy should be performed as attested to by the favorable results of the indwelling urethral catheter. Between January 1913 and January 1915 suprapubic prostatectomy was performed in 1783 cases at the Mayo Clinic. In only 437 (4.6 per cent) was preliminary cystostomy necessary. While the average mortal-

ity rate following prostatectomy at the Mayo Clinic for the twelve year period was 5.5 per cent the mortality rate for the two stage operation was 7.5 per cent as compared to 4.8 per cent for the one stage operation. The mortality rate following the one stage operation was lower than the two stage by virtue of the better general condition of the patients selected for this method and the mortality rate following the two stage operation would have been lower than it was had the latter been employed as a routine in all cases. However, as approximately 75 per cent of patients when carefully selected may be satisfactorily prepared and operated on by the one stage method with relative safety the diluent effect on mortality rate is an insufficient reason for employing the two stage operation as a routine. Whatever the various opinions regarding the one and two stage procedures drainage of the bladder by urethral catheter or cystostomy permits recovery from renal insufficiency with stabilization of renal function and decreases the stress on the cardiovascular system and respiratory apparatus.

EFFECT OF PRELIMINARY DRAINAGE

Between January 1913 and January 1925 there were 113 deaths following suprapubic prostatectomy at the Mayo Clinic. Fourteen occurred from 30 days to as late as 6 months after operation but these resulted from conditions existing prior to operation or from intercurrent conditions to which the operation bore no relation. These cannot be considered as surgical deaths. However 99 of the deaths occurred within 30 days after operation and even though it would seem that in some instances the operation was but an incident and had little to do with the death these are all classified as surgical deaths. Thirty three of the patients who died had been prepared by suprapubic cystostomy and obviously comprised the group of patients who on account of associated vesical lesions marked renal insufficiency and poor general condition were the poorest surgical risks. 22 were prepared by permanent or intermittent urethral catheter drainage and as a group comprised patients who were considered as fair surgical risks. 44 had small amounts of residual urine and no



Fig 3 Fracture of lower end of humerus

on the part of the organism to establish a mechanical relationship to abnormal surroundings at first serve a useful purpose but later tend to shorten the life of the individual. In no instance is this law so true and so clearly illustrated as it is in the case of what I call the first and last kink. The effect upon the entire gastro intestinal tract is in the first instance simply mechanical and is analogous to that which would result in every house in a town from a block in its main sewer. Later it results in the contamination by septic organisms of the nutrient material dammed back and stagnating in the small intestine and stomach and in the terrible sequence of the innumerable morbid sequelae which ensue in consequence of these mechanical and toxic conditions. When I first called attention to this kink and its consequences the less observant and more conserva-

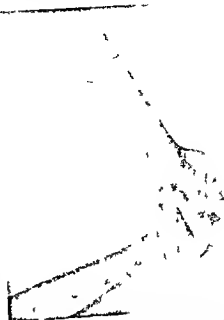


Fig 4 Fracture of lower end of humerus

tive portion of the profession denied their existence and some isolated members with that want of courtesy which is so often associated with a corresponding lack of comprehension boldly asserted that the kinks were not present in the patient's body but existed only in my brain.

The more intelligent section of the medical profession looked for and investigated the several kinks I described and finding them began debating their origin. Some believed that they were produced by inflammation since they could not conceive of an acquired band or adhesion arising in any other way. Others considered that they were congenital. Many observers while recognizing them were of the opinion that they did not exert any control over the passage of the contents through the anchored bowel. The simple manner in which they come about was not realized for the obvious reason that the very definite changes which the body undergoes when its mechanical relationship to its surroundings is altered from the normal received little or no attention from a profession accustomed to deal only with the end results of stasis which constitute surgery and medicine.



Fig 5 Fracture of lower end of humerus

PHYSIOLOGICAL PRINCIPLES IN THE TREATMENT OF BENIGN HYPERTROPHY OF THE PROSTATE¹

By WALTERMAN WALTERS M.D. ROCHESTER MINNESOTA

Section of Surgery May Clinic

INCOMPLETE obstruction whether in the stomach intestine common bile duct or urinary tract produces a toxæmia with the accumulation of non protein nitrogen, such as urea in the blood due to an increase in the breakdown of the body proteins or to its retention in the blood stream resulting from the failure of abnormally functioning kidneys to eliminate it. With the toxæmia and accumulation of urea in the blood the acid alkali balance may be disturbed with resulting acidosis or alkalosis. These chemical changes in the blood caused by the obstruction unless recognized and compensated for may cause the death of the patient. Although the relief of the obstruction whether it is biliary intestinal or urinary is essential to ultimate recovery it should not be undertaken until the condition of the patient affords a reasonable assurance that an operation may be safely performed.

METHODS OF RESTORATION

The preparation of such patients for operation demands the correction of the function of the kidneys liver and intestinal tract, and the control of infection. The neutralization detoxication and elimination of the toxic products resulting from the obstruction are essential. The necessity for maintaining a normal fluid balance in the body is apparent in every type of disease. Water in sufficient amounts drunk by the patient allows an interchange of fluids between the body tissues and the blood. It is a solvent and diuretic and is of great value in the elimination of nitrogenous material such as urea and creatinin. The concentration of water in the blood stream affects the regulation of body temperature as shown by Barbour. A diminution of the fluid content of the blood causes a decrease in the oxygen carrying power of the red blood cells by reason of increased viscosity.

The intravenous injection of a 1 per cent sodium chloride solution, which has been used by Bumpus in the preparation of patients with benign hypertrophy of the prostate who are handicapped by disturbance of renal function not only supplies the blood and tissues with fluid but increases the number of chloride molecules which may have a detoxicating effect as evidenced by the satisfactory control of toxæmia in other types of obstruction and stasis.

The condition of the patient is dependent not so much on what passes from the body by way of the kidney the intestine and the skin as on what remains in the blood and in the tissues. Whereas many years ago the constituents of the excretory products were looked to for an indication of the functional capacity of an excretory organ we now look to the blood and determine accurately what is being retained in the body.

Sodium chloride solution injected intravenously usually suffices to control the toxæmia co existing with prostatic obstruction. It is sometimes advantageous to add glucose since it is quickly oxidized in the body to produce heat and energy. This can be done by the continuous intravenous drip suggested by Matas or by means of repeated injections of a 10 per cent glucose and 1 per cent sodium chloride solution which has been found by McVicar adequately to control the toxæmia resulting from gastro intestinal stasis. Opie and Alford have shown experimentally that when sufficient carbohydrate is supplied to animals the effects of chloroform and phosphorus poisoning on the liver cell are considerably lessened. In the case of toxic products of protein disintegration glucose besides protecting the cell, probably forms glyconates with them in which form they are excreted. It is a reasonable hypothesis that the beneficial effect derived from the intravenous injection of glucose is partly

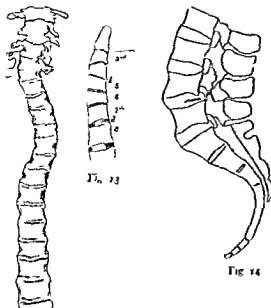


Fig 12

Figs 12 and 13 Spine of laborer who carries loads on his head

Fig 14 Lumbar vertebrae and sacrum of coal trimmer

of the intestinal contents the contamination of the food supply of the body the flooding of the circulation with organisms toxins and other poisonous bodies and the consequent deterioration of the cells of every tissue in the body rendering them liable to the invasion of organisms and to the production of innumerable diseases.

Perhaps the term that best describes chronic intestinal stasis is that applied to it by Pauchet. He calls it *the great disease since it is the cause of nearly all the pathology of civilization*. Its manifestations commence in early childhood and end only in death.

It would occupy your time unnecessarily if I were to attempt to describe in detail the enormous mass of disability physical deterioration and disease which is the direct result of chronic intestinal stasis and the many infections which can find a foothold in the human body only because of the depreciation of the vitality of the tissues by auto-intoxication. Indeed it is not an exaggeration to say that we suffer and die through the defects which arise in our drainage scheme.



Fig 15 (left) Fourth lumbar vertebra of coal trimmer
Fig 16 Seventh cervical and first dorsal vertebra of coal trimmer

The treatment of chronic intestinal stasis varies with the stage at which it has arrived and with the nature of the complications consequent upon it.

In the vast majority of cases the obstruction which results from the presence of a first and last kink or from an excessively elongated pelvic colon can be met effectually by the use of that excellent lubricant paraffin which has done more to improve the health of the people to alleviate suffering and to prevent disease than any other known substance.

The auto-intoxication which arises because of the infection of the stagnating contents of the small intestine can be controlled by the use of kaolin.

By avoiding the use of all meat and fowl which are liable to decompose in the infected contents the infection of the blood stream by toxins etc. is reduced still further.

The inflammation of the mucous membrane of the intestine which is so often present and which increases the already existing obstruction by producing spasms of the muscular coat can be very materially benefited by belladonna.

In the advanced stages of stasis the careful freeing and division of the bands which form the first and last kink and the accurate covering of any raw surface by peritoneum restore to the affected bowel and to its mesentery its normal anatomy and function.

Colectomy is called for only in the most advanced cases which are not infrequently complicated with rheumatoid tuberculous or other infection.

Any secondary infection or complication should be sought for and if found thoroughly treated.

Nothing can be more satisfactory than the treatment of chronic intestinal stasis either

in which the operation was performed for one reason or another by the perineal route

APPROACH TO THE PROSTATE

In a discussion of any operative procedure it should be borne in mind that when more than one procedure can be used for the treatment of a surgical condition the one chosen should be that which can be followed with the greatest degree of safety to the patient and which carries the least risk of unpleasant postoperative complications and sequelæ

In general there are indications for both the suprapubic and the perineal methods of approaching the hypertrophied prostate depending on the condition of the patient and the specific pathologic condition of the urinary tract. When routine preliminary preparation of all patients with urinary obstruction is carried out prior to operation and the patient's condition enables him to withstand operation the risk of prostatectomy is approximately the same whether the gland is removed through a suprapubic or a perineal incision. The suprapubic transvesical approach has the advantage that it permits the removal of co-existent lesions of the urinary tract such as vesical stones and diverticula or even tumors of the bladder. While this is impossible in a one stage perineal operation exploration and drainage of the bladder preliminary to perineal prostatectomy as carried out by Lowsley overcomes this disadvantage. It has been the experience at the clinic in most cases that the presence of vesical stones or diverticula contra indicates a one stage operation since they are usually associated with infection of the urinary tract which combined with the additional operative procedure increases the risk of prostatectomy. In some instances however diverticula may exist with but little cystitis and the absence of infection and of foul urine in the diverticulum may permit by means of a suprapubic approach to the prostate the safe excision of the diverticulum at the same time as the prostate is removed. On the other hand Bugbee has obtained his best results by performing suprapubic prostatectomy in two stages as a routine treating

associated lesions of the bladder and providing drainage at the first operation and later when the condition of the patient permits enucleating the gland after enlarging the suprapubic drainage sinus sufficiently to permit the introduction of the finger into the bladder.

Without preliminary preparation including control of urinary infection and in the absence of studies of renal function to determine the capacity of the kidneys the risk of a one stage operation may be lower when the prostate is removed through a perineal incision on account of the dependent drainage and because the perivesical tissues have not been opened to infection. When the prostate is small and considerable prostatitis is present the perineal operation can be expected to give good results. This applies particularly when the obstruction is a result of compression of the prostatic portion of the urethra by adenomata of the lateral lobes. Previous operations on the bladder may cause it to contract to the extent that the perineal approach to the hypertrophied gland becomes preferable. Postoperative ventral hernia complicating such previous operations may indicate a perineal operation which can be thus performed without fear of opening the peritoneal cavity. Recently it was necessary to perform perineal prostatectomy in a case in which a large postoperative ventral hernia had developed following three previous operations on the bladder elsewhere for the removal of vesical stones.

Should the perineal approach be chosen, the technique of Young has become classic as a model. Davis has devised a hæmostatic bag to be used after perineal prostatectomy and this has proved as satisfactory in the control of immediate hæmorrhage following perineal prostatectomy as the Hagner-Pulcher bag in the suprapubic operation. Still considerable experience is required for perineal prostatectomy if uniformly good results as measured by urinary control and healing without fistula are to be expected. Occasionally even after skillfully performed perineal prostatectomy these unpleasant sequelæ occur and may necessitate secondary operations.



Fig 23 (left) Lower end of right humerus of coal trimmer

Fig 24 Upper end of right radius of coal trimmer

tinal stasis and all its manifestations and results. Cancer is only one of the consequences of stasis but it is infinitely the most incurable and fatal.

The prevention of cancer can be brought about only by a complete revolution in our diet and habits. We must eat such food as will obtain for us the same results that exist in primitive man and we must discard such diet as is deprived of the important components of natural foods. The public must be educated in the knowledge of food and must be impressed by its extreme importance to health.

I am certain that they will be keenly interested in the subject when they learn the explanation of the very simple causes which bring about so much illness, misery and death and recognize the far reaching result of those causes. We must employ every means in our power to distribute information broadcast in the community by literary efforts by propaganda in the newspapers etc. We will

thus ensure that a new people will grow up and replace the miserable specimens of humanity which form quite a considerable proportion of the inhabitants of civilized countries especially in the large towns.

Now I come to the important suggestion to which I wish to call your most urgent attention and to ask for all the help you can give in the matter.

It must be perfectly obvious that it is much more desirable and easy to endeavor to prevent the occurrence of cancer than to attempt to deal with it surgically when the condition is established since we are all familiar with the fact that when first detected it is so frequently already ineradicable. With that end in view



Fig 25 Right elbow joint of coal trimmer



Fig 26

Fig 27

Fig 28

Fig 26 Atlas of shoemaker

Fig 27 Axis and third cervical vertebra of shoemaker

Fig 28 Occipital bone of shoemaker



Fig 28a Photograph of the bones removed from the right thumb of a shoemaker

in which the operation was performed for one reason or another by the perineal route

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the very different strain to which they were exposed in these occupations.

Figures 23, 24 and 25 are the bones forming the elbow of the coaltrimmer. They afford excellent examples of the manner in which an old mechanism can be modified without the exercise of pressure or strain. It is immensely to the advantage of this laborer in the performance of his work that he should not have to control the movements of flexion and extension by muscular exertion. This is effected by the deposit of bone on the floors of the coronoid and olecranon fossa. In this manner the possible range of movement in this joint is limited to the special requirements of his occupation.

Figures 26, 27 and 28 show the developments that have taken place in the occipitoatlantal articulation and adjacent

vertebrae of an aged shoemaker. Among other changes there is seen a pillar of bone which has grown up from the lateral mass of the atlas and has formed an arched union with the under surface of the occipital bone. It is clear that this new mechanism has arisen without the aid of pressure or strain with the object of minimizing the expenditure of nerve and muscle energy consequent on the jerk of the head when the thread is pulled forcibly and abruptly through the leather.

Figures 29 and 30 show many interesting changes which occur in the skeleton in extreme old age due to the absence of attitudes of extension and abduction and only to the presence of attitudes of flexion and adduction. The results of pressure and strain are well demonstrated in these instances.

Traces of acetone in the urine as shown by a weakly positive sodium nitroprusside test may be neglected but any well developed ketone intoxication should be actively treated by increased carbohydrate and insulin administration. Severe degrees of ketosis are unusual unless the case is one of infection when the insulin requirement may be as much as 50 units every 4 hours and glucose given in amounts necessary to control hypoglycemia. As a rule acidosis will clear up with the ketosis under insulin treatment. When marked however alkali may be given but when this is done the amount of alkali given should be determined and controlled by the carbon dioxide combining power of the blood serum.

The nutrition of the patient and the diet require special consideration. Not only is it inadvisable to attempt desugarization by a course of undernutrition but under insulin administration it is possible to prescribe any diet which may be considered necessary to strengthen the debilitated patient. This is especially the case in preparing for operation patients with chronic cardiovascular disease. In uncomplicated cases it is usual to supply a diet containing $\frac{3}{4}$ to 1 gram of protein per kilogram of body weight and sufficient fat and carbohydrate to provide calories 30 per cent above the basal caloric requirement. Carbohydrate should not be restricted too closely. It is the most readily available form of energy and besides this excess carbohydrate appears to be of value in protecting the liver during the course of the anesthetic and operation. Thirty grams of carbohydrate may be given over and above the usual amount calculated to prevent ketosis. Milder diabetics will tolerate this maintenance diet readily. Many cases however will require insulin which should be administered in amounts adequate to lower the blood sugar level within the normal range. Twenty to 40 grams of glucose or other carbohydrate and 15 units of insulin should be given 2 or 3 hours before the operation.

Postoperative treatment should be carried out to anticipate the disturbances in metabolism as they develop. It is probable that any degree of operative interference aggra-

vates the diabetic state and further damage to the islets of Langerhans may result. Small doses of insulin, such as 10 units 3 times a day may be given as a matter of routine as soon as food is taken. This dosage however should be based upon the determination of urinary sugar and when possible that of the blood. In major operations some degree of hyperglycemia is unavoidable but insulin should be increased in an attempt to control the rising blood sugar level. When the patient is able to take food a suitable diet is provided by milk and cream and when tolerated eggs fish fowl meat vegetables and fruits gradually added to a maintenance level. Fluids should be provided freely.

After operation ketosis may develop very rapidly and means must be taken to reestablish adequate carbohydrate utilization. When there is hyperglycemia and glycosuria increased doses of insulin may be sufficient for this purpose. Otherwise additional carbohydrate must be supplied. Postoperative nausea and vomiting may occur aggravated by the ketone intoxication and marked dehydration may set in. It may be necessary therefore to administer the glucose and fluid intravenously giving 500 cubic centimeters of 5 per cent solution as often as may be required. In the event of infection or severe toxemia the insulin value may be markedly lowered and the patient may require even as much as 50 units or more 4 times a day. Under such conditions the insulin administration must be pushed until its effect is observed in the lowering of the blood sugar level and the control of the ketone intoxication.

What has been said about the diabetic surgical risk applies with equal force to the pregnant diabetic. The use of insulin has been advocated in the pernicious vomiting of pregnancy. This however does not seem to be necessary for according to a recent study by Harding and Van Wack now in press the ketonuria is the result of dehydration. They come to this conclusion. Its use in skilful hands may be harmless but we do not believe it to be a valuable adjuvant to treatment and the successful treatment of hyperemesis gravidarum depends upon the use of fluids.

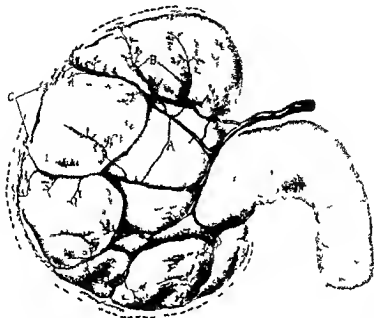


Fig. 3 Diagram based on celluloid corrosion preparations showing the relation of the arterial circulation to the unlobed pelvis in advanced hydronephrosis (about 70 days). A Interlobar arteries B Arcuate arteries C Interlobular arteries. The complete atrophy of all the finer arterial radicles excepting the few in immediate association with the larger trunks is here apparent.

was exposed through the lumbar route and divided between ligatures about 2 centimeters below the sinus renalis. In the other series ligation and division of the left ureter were made above the bladder through a mesial transperitoneal incision.

The hydronephrotic changes produced by the two sites of ureteral ligation were similar except that to a certain extent the higher obstruction favored a more rapid development of the changes.

After total left ureteral obstruction animals were sacrificed at weekly periods from 7 to 70 days. Two animals were sacrificed at each period in one an arterial injection alone was made and in the other the arterial injection was combined with that of both ureters.

Before the actual technique of celluloid injection was commenced each animal as sacrificed was carefully eviscerated through a mid ventral incision the esophagus above and the rectum below being divided between ligatures also the coeliac axis and the mesenteric

vessels. To allow freer access to the thoracic aorta the head and forequarters of the animal were resected by cutting circularly through the thorax about its middle. A loose single knot ligature was then passed around the thoracic aorta about 2 centimeter from its divided end and another around the abdominal aorta just proximal to its bifurcation. No attempt was made at this juncture to skin the animal.

Prior to celluloid injection thorough irrigation with warm normal salt solution is made through the aorta until the outflow from the divided inferior vena cava comes clear.

Gentle massage of the kidneys during the irrigation favors more complete removal of the blood.

The ligature previously applied loosely around the abdominal aorta above its bifurcation is now tightened. The double injection technique was employed throughout the series injection being made into the thoracic aorta. The general procedure has already been

of half its terrors By his original method of direct end to end anastomosis of divided arteries he laid the foundation for the modern conservative treatment of wounded blood vessels He gave a new hope to the victims of pulmonary tuberculosis by adding artificial pneumothorax to our therapeutic resources He illumined our knowledge of nerve repair and injury Last but not least he revolutionized and systematized the principles and practice of joint surgery thus laying the foundation for the rehabilitation of numberless cripples by his method of modern arthroplasty

Lane gave us a metallic plate and the mechanical implements which modified in many ways have been instrumental in transforming the old methods of bone setting into a finished osteoplastic art He gave a new outlook on the treatment of fractures and created a veritable renaissance in the history of the traumatology of the skeleton He taught us new methods by which to overcome many hitherto insuperable difficulties in the cure of cleft palate He taught us how to save lives that would otherwise have been lost from the migration of acute ear infections by the timely ligation and excision of the jugular vein He taught us the secrets of a new technique based upon a mastery of anatomical detail which made the extirpation of the entire colon a feasible and legitimate operation He gave us a new view of the mechanism and effects of chronic intestinal stasis and in doing this he pointed to hitherto undescribed anatomical anomalies and pathological membranes which retarded the faecal circulation now familiar to us as

Lane's kinks, but more than this he created a new clinical picture of chronic intestinal toxæmia, which is now known as Lane's disease

Both Murphy and Lane enlarged our vision, by expanding the surgical horizon and leading us to new surgical possessions which we are now industriously cultivating with profit and with promise of still greater benefits The broad concepts and innovations initiated by both have gone through many vicissitudes and modifications since the time when they were first given to the profession, but whatever the future may have in store for their ultimate destiny in theory and practice the names of Murphy and Lane will remain permanently inscribed in history as men who made surgery better than they had found it

How fortunate and fitting that this hour which we have reverently consecrated to the memory of an illustrious founder who gave luster and world renown to American surgery should be graced by the presence and praise of one who shared with him in an allied sphere the glory of the pathfinder and the pioneer! It is a tribute of one master to another master It is the voice that proclaims the solidarity of our guild its unity of purpose its aspirations and endeavors its labors and its sacrifices its rejoicings and its rewards in promoting the welfare of mankind

And this is the soul of surgery and the spirit which animates this College which we see embodied in John Benjamin Murphy and in the person of our honored friend and guest Sir Arbuthnot Lane

THE JOHN B. MURPHY ORATION IN SURGERY

YOU have done me a very great honor in asking me to deliver the Murphy Oration I need hardly say that I am very proud and pleased to do it and that I heartily appreciate the compliment the invitation carries with it I have paid you so many visits and have always been received in such a very cordial and friendly manner that I am almost tempted to regard myself as one of yourselves Certainly I am intensely in sympathy with the magnificent efforts you are making to advance our profession from every point of view

Like you all I loved that great big hearted generous man who was so full of enthusiasm and energy Though seriously handicapped by feeble health he never allowed anything to interfere with the work in which he took so much pride and interest so that he maternally shortened his life

I was very fortunate in making Dr Murphy's acquaintance many years ago as I had obtained one of his buttons and had used it successfully 6 months before anyone else in England The case was published in the *Lancet*

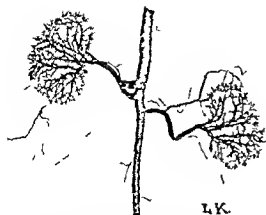


Fig 5 Normal renal circulation. Celluloid corrosion preparation. Rabbit. Arterial injection made from thoracic aorta. All branches of the abdominal aorta have been resected with the exception of the renal arteries and a few minor lumbar twigs. The abdominal aorta itself has been divided about the level of the inferior mesenteric artery. The specimen shows clearly the relationship of the renal arteries to each other and their manner of individual distribution. L. K. Left kidney.

cast of a large thin walled hydronephrotic sac is not easy with the celluloid corrosion method. The degree of tension during injection requires careful supervision. A slightly excessive pressure will rapidly produce rupture of the sac and extravasation, whereas the employment of too little pressure will result in imperfect filling and an erroneous conception of the degree of pelvic dilatation.

To ensure complete setting of the celluloid injection mass the specimen should be allowed to remain under water for fully 24 hours positive pressure being kept up throughout at the points of injection. At the conclusion of this period the specimen is carefully skinned and placed in pure hydrochloric acid. After corrosion in pure hydrochloric acid for 24 to 48 hours the celluloid casts are washed free from the digested tissues by a stream of water. By removing all branches of the abdominal aorta other than the two renal arteries we could more clearly interpret the specimen.

Since the celluloid corrosion preparations were made by injection through the thoracic aorta the injection mass was necessarily distributed evenly and simultaneously to both renal arteries. Therefore the arterial changes



Fig 6 Hydronephrosis of left kidney duration 7 days. Celluloid corrosion preparation. Rabbit. Complete arterial and bilateral ureteral injection. Left ureteral obstruction low. On comparison the left kidney shows a dilated ureter with hypertrophy of its accompanying artery. The general arterial distribution presents beginning rarefaction.

presented by the kidney with obstructed ureter may very readily be judged by comparison with the arterial structure of the opposite healthy kidney.

ANATOMICAL CONSIDERATIONS RELATING TO THE RENAL PARENCHYMA

The parenchyma of the kidney presents four zones from without inward: (1) subcapsular zone or cortex *cortical* } *cortex proper*; (2) *cortex medullary*; (3) *cortex medullary*; (4) medulla. For the purposes of this article the relationship of the arterial distribution to these zones may be taken as follows:

1. The subcapsular one contains only the efferent vessels and capillaries of the most peripheral glomeruli.

of half its terrors. By his original method of direct end to end anastomosis of divided arteries he laid the foundation for the modern conservative treatment of wounded blood vessels. He gave a new hope to the victims of pulmonary tuberculosis by adding artificial pneumothorax to our therapeutic resources. He illumined our knowledge of nerve repair and injury. Last but not least he revolutionized and systematized the principles and practice of joint surgery thus laying the foundation for the rehabilitation of numberless cripples by his method of modern arthroplasty.

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Fig. 10. Hydronephrosis of left kidney duration 33 days. Combined arterial and pelvic injections were made. In the affected kidney the circulatory changes are shown in their relation to the distended cavity of the pelvis. Two posterior interlobar arteries have been resected in order to reveal the degree of pelvic distention.



Fig. 11. Hydronephrosis of left kidney duration 56 days. Low ligation of ureter. Combined arterial and bilateral ureteral injections. Note compression of the distended calyx margins of the obstructed pelvis. The finer arterial radicles toward the outer border of the kidney are seen at this period comparatively numerous though definitely impaired.

3. The *cortico medullary zone* contains the terminations of the interlobar trunks and their continuations of the arcuate arteries. The origins of the interlobular branches are present in this zone since they arise from the convexities of the arcuate arteries and the lowermost glomeruli associated with them at this level together with the glomeruli which take origin directly from the arcuate trunks. The efferent vessels of the glomeruli situated in this zone descend in characteristically straight bundles into the medulla and are known as the *arterie recte*.

4. The *medulla* contains only the straight efferent vessels of the glomeruli of the cortico medullary zone. These efferent capillaries grouping themselves between the collecting tubules accompany them to their terminations in the papilla of the medulla.

The changes which each portion of the circulatory tree undergoes during the process of hydronephrotic distention and atrophy are

coincident upon the alterations in the various parenchymal zones.

The renal circulation pursues two directions in relation to the cavity of the pelvis: circumferential and radial. The interlobar and arcuate arteries may be said to pass around circumferentially whereas the interlobular arteries and the fine *arterie recte* (excepting those arising from the areas of the two poles) pass radially in relation to the renal pelvis.

THE ARTERIAL CHANGES AS OBSERVED IN THIS EXPERIMENTATION

With complete ureteral obstruction and consequent pelvic distention the renal parenchyma becomes compressed and then progressively displaced outward by the distending force within. When hydronephrosis is established the two changes which the parenchyma undergoes are coincident. At first however compression of the medulla as evidenced by recession of the papilla precedes the change

compliment to me as president as well as to the surgical profession of America. Your colleagues certainly did themselves proud and all who had the opportunity of attending the Congress say that it is the best meeting we have ever had from an educational standpoint.

I feel that I cannot do better than to discuss with you that subject which was nearest his heart when I last saw him, since I am certain that he would have a led me to do so if he were alive and with us here.

I am very glad to do it since I realize that intestinal stasis is the dominant factor in medicine being the basis of all morbid conditions peculiar to a state of civilization and that the greatest duty that devolves on the members of our profession is by obviating its development to prevent disease to safeguard the community from the misery ill-health, and loss of earning capacity it entails and to raise the physical standard of the people to the highest possible level. If we can succeed in doing this our general happiness and well-being will be enormously increased and the maximum enjoyment of life secured.

It is not that I wish to depreciate the skill and ability of surgeons and physicians who do their utmost to deal with the symptoms and end results of chronic intestinal stasis but I am convinced that it is only by following the course indicated, namely by prevention that stasis and its end results will cease to exist and the necessity for building an increasing number of hospitals and asylums will disappear simultaneously.

Such was the idea that permeated Murphy's brain and one which I am proud to share with him in endeavoring to carry out in this oration devoted to his great memory such views on the prevention of disease as I believe would be acceptable to him if he were present with us.

In order to be able to obviate the incidence of disease it is absolutely necessary that in the first instance we shall clearly understand the factors upon which its development depends. Here nature affords us endless experimental evidence and supplies us with definite data on which we can base our arguments and formulate our views.

There are still existing large native races who are living under normal conditions in

their natural surroundings and are eating precisely the same food they have eaten for many hundreds or thousands of years. They have continued the same habits without any variation.

We can also trace these people through the varying degrees of civilization to which they have been exposed owing to their coming in contact with the white man eating his food and imitating his habits. We observe that while living their normal life in natural surroundings they lead a very happy existence in the full enjoyment of all the pleasures of life. Their very smile suggests a cheerful disposition and a happy outlook on life generally.

They may not infrequently have circulating through the several tissues of their bodies a great variety of organisms usually in the form of minute worms.

In the vast majority of cases they suffer very little if any inconvenience from their presence since they do not interfere materially with their activity or with the satisfaction of their appetites. Occasionally as in the case of yellow fever, cholera, plague, dysentery, etc. the virulent organisms which are the causes of these diseases may prove fatal very rapidly. While the mortality resulting from these infections is great we must remember that they will be eliminated sooner or later by sanitary methods. These natives suffer from none of the diseases of the gastro intestinal tract nor from the consequences of such affections as abound in civilized communities which are exacting a rapidly increasing toll from the lives, health, happiness and general vigor and physique of the race.

The general physique of these natives is magnificent while all their functions are performed normally and efficiently so that they live healthy, vigorous, happy lives. The negroes afford us excellent experimental evidence of the effect which varying degrees of civilization have upon them for the reason that they migrate from their normal surroundings and acquire the food and habits of those with whom they become domiciled and whom they are proud to imitate unfortunately to their serious detriment.

As you trace them up through Central America, through the Southern States and finally

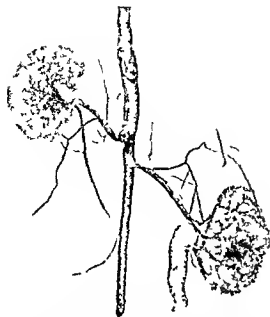


Fig 14 Hydronephrosis of left kidney, duration 70 days. Combined arterial and bilateral ureteral injections. The total size of the obstructed kidney is in this specimen not much larger than that of the opposite healthy kidney, but its vasculature shows a marked atrophy.

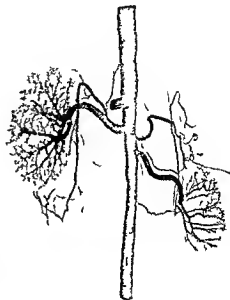


Fig 15 Hydronephrosis of left kidney, 143 days duration. Arterial injection. The gross size of the obstructed kidney is here relatively small and is associated with complete atrophy of all the finer arterial radicles (interlobular arteries) excepting in the immediate vicinity of the interlobar and arcuate vessels where a few origins of markedly altered interlobular twigs persist. A comparison between the circulations of the two kidneys at this advanced period very striking.

diminished blood flow and ischemia which produces a lowering of tissue tone that hastens the stage of complete parenchymal atrophy.

It is evident that the ultimate ramifications of the arterial tree atrophy first and that the last to survive are the main trunks and their immediate branches. Atrophy proceeds centralward from the finer radicles where the blood pressure is low to the larger branches and finally attacks the main trunks the continued pressure of which being high resist complete obliteration.

As glomeruli are indicative of functioning tissue only those that arise from or are in the immediate proximity of arcuate arteries are capable of resisting for a time the atrophic process. Islands of functioning tissue in organs presenting advanced hydronephrosis are accordingly to be found in the lines of immediate distribution of the main arterial trunks.

Figures 5 to 15 inclusive are direct photographic reproductions of celluloid corrosion preparations. On the analysis of these specimens together with that of many others the

description in the text is based. Four diagrams are included to facilitate explanation.

SUMMARY

1 The arterial circulation of the rabbit's kidney is distributed in two different planes within the parenchyma in relation to the pelvis of the kidney. The main subdivisions of the renal artery pass around circumferentially whereas the finer branches are distributed radially to the cavity of the pelvis.

2 With the production of hydronephrosis the arterial circulation undergoes two phases of alteration. The first phase occurring at the onset is relatively short and appears for the most part to be a purely mechanical interference. In the second phase which soon supervenes, there is in addition to this me-



Fig 1 Fracture of lower end of humerus

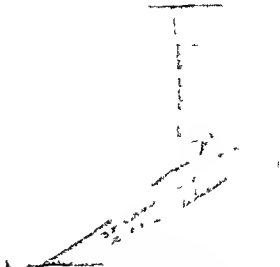


Fig 2 Fracture of lower end of humerus

3 Strain produces definite changes

4 When apart from the exercise of pressure or strain it is important from the altered mechanical relationship to man's surroundings that an old mechanism should be modified or an entirely new one developed such a change takes place. The modifications in the structure of the body which arise in obedience to these laws ensue in order to meet the altered mechanical relation of the individual to his surroundings and to economize the expenditure of nerve and muscle energy.

The principles which govern the mechanical relationship of the organism to the gastro intestinal tract which is inside the body differ in no particular from those that influence its behavior in its mechanical relationship to surrounding objects. *Precisely* the same laws apply in both instances.

The consequences which result from the habitual overloading of the end of the large bowel with at least 24 hours accumulated contents a condition which is practically universal in our state of civilization and is recognized as being normal are met on the part of the organism by an attempt to control the excessive dilatation distention and elongation of the portion of the intestine which is affected by that accumulation. The effort to establish this control is usually more or less successful. The degree of success attained varies

See comments on illustrations 1 & 4 of article

with the vitality of the individual. The attempt to control these changes results in the formation of acquired firm strong bands or membranes simulating peritoneum in appearance which are practically crystallizations of lines of force. They develop along the lines of strain on the under surface of the mesentery of the iliac colon and gradually secure contract and shorten it. Finally they grip the bowel itself rotate it on its longitudinal axis and fasten it to the floor of the iliac fossa. The alteration in the functioning of this portion of the intestine which is caused by the formation of these bands and by the mechanical effect they exert upon the mobility of the intestine leads to a corresponding degree of interference with the passage of material through the anchored and obstructed bowel. In civilization the consistency of the contents of this portion of the large bowel is almost always firm and may often be quite hard a condition which increases still further the resistance which the fecal matter undergoes in its passage through the anchored and obstructed iliac colon. In respect of this factor I need hardly recall to your mind that cancer of the large intestine is eight times more common in the left half of the abdomen than it is on the right side.

I would remind you of another law which I formulated namely that *all the changes that ensue in the body in consequence of the endeavor*

THE USE OF DIATHERMY AND OF THE QUARTZ LAMP FOR CONSERVING THE TEMPERATURE OF THE VISCERA AND PROMOTING THE WELFARE OF THE PATIENT BEFORE AND AFTER ABDOMINAL OPERATIONS

BY C. W. CRITT, MD, FACS, CLEVELAND, OHIO

(Continued)

THAT chilling the intestines produces a deleterious and warming a beneficial effect has always been known. That exposure of the abdominal viscera of itself alone may produce a fatal result has been frequently observed in the clinic and in the laboratory.

For the patient in shock the application of heat is a primary and most effective method of restoration. Zondek, Taylor and others have shown that the application of cold over the abdomen is more rapidly effective than the application of heat. According to Zondek,

Our findings confirm those of Chelmonski, Wendriner and Schutze, Lichel and Schemel and others who conclude that cold applications to the body surface cause a lowering in temperature of the underlying organs and warm applications affect temperature to a less degree. Taylor found by means of thermocouples that heat penetrates to a greater extent through the abdominal viscera than through skeletal muscle but that in no case was the general body temperature raised by the local applications of heat. Stengel and Hopkins found that the application of ice bags over the gastric area produced an average drop of from 0.9 to 1 degree Centigrade in 45 minutes while the effect of hot water bottles in the same position for the same period was almost negligible.

These apparently anomalous observations indicate that the function of some vital organ or tissue has been depressed by the lowering of temperature caused by the application of cold, this fact explaining why the application of extensive hot packs is insufficient in some cases to overcome the result of the exposure of the viscera in the course of an abdominal operation.

An attempt to identify the organ the function of which is depressed by cold and a

search for some method whereby the depressing effects of cold upon the viscera might be obviated resulted in experimental researches which demonstrated that the liver is impaired by any condition which impairs the organism as a whole. In studies of variations in the temperature of various organs and tissues under many different conditions we found that the temperature of the liver together with the temperature of the brain fell progressively when the viscera were exposed the fall being comparable to that which followed the removal of the liver. These studies appeared to show that cold practically eliminated the essential function of the liver. Moreover we found that the removal of no other organ except the brain produced so marked an effect upon the organism as the removal of the liver which is followed by the rapid and steadily progressive failure of function of all the organs of the body. This effect is even more marked than that which follows the removal of the brain itself as if artificial respiration can be maintained the rest of the organism can survive for a longer time without the brain than without the liver after removal of the liver the application of no known method of restoration or of conservation can check the steady decline of the organism to death.

We must conclude therefore that the liver is an organ which performs a major function in the organism a function which is at least as essential to life as are the functions of the brain the heart or the blood. It follows that to the extent to which the liver of a patient is functionally impaired to that extent is he unable to sustain an operation upon any part of the body and the surgical risk is increased at the surgical attack of itself further lessens the activity of the liver. In planning the management of surgical operations there



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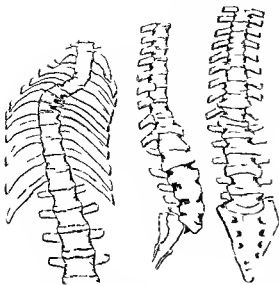


Fig. 6 (left) Spine and ribs of a brewer's drayman
Figs. 7 and 8 Spine of coal heaver



Fig. 9 Fourth and fifth lumbar vertebrae and sacrum of coal heaver
Fig. 10 Fifth lumbar vertebra and sacrum of deal porter
Fig. 11 Fourth and fifth lumbar vertebrae and sacrum of laborer who carried loads in front of him

While in a considerable proportion of cases the body has sufficient vitality to form these bands and to effect an obstruction limited to this area in a number of feeble subjects because of a want of formative capacity either no bands are developed or they are not sufficiently strong and rigid to secure the colon which escapes from their controlling influence. In consequence the pelvic colon becomes progressively elongated and distended. The puddling in the pelvis of this elongated and dilated distal portion of the colon produces a degree of obstruction to the passage of solid contents through it which is increased by straining in the effort to expel the motion. It is important to realize that the obstruction so produced is often much greater than that which results from the limited and localized obstruction brought about by the acquired bands forming the first and last kink. The consequences of this type of obstruction in feeble subjects differ from those produced by the kink in that throughout the length of the proximal intestinal tract little or no effort is made to control the elongation and distention of the colon, small intestine and stomach. Consequently ulceration and cancer of the large bowel, duodenum and stomach so common in association with the first and last kink, which are due to a definite local con-

striction occur very rarely. It is to this condition that the term enteroptosis has been applied and many surgeons have endeavored to benefit their patients by performing such futile operative procedures as sewing up the several dilated and elongated segments of the proximal bowel apparently not realizing the causation of the condition. On the other hand in this type which may for convenience be called the atonic variety, the infection of the food supply which is accumulated in much greater quantity in the elongated dilated bowel and the consequent intestinal auto-intoxication together with the changes resulting from it form a very much more marked feature. All the mechanical changes I have described have been confirmed radiologically by Dr. Jordan who has studied the subject very closely for many years. They have also been fully verified in every detail by Dr. Nathan Mutch by his accurate thorough and complete investigations in the postmortem room of bodies of patients who died of cancer in the wards of Guy's Hospital.

I need hardly remind you of the disastrous sequelae which result from obstruction of the colon whether by the formation of bands or by an excessive elongation of its terminal segment. Briefly they are inflammation of the mucous membrane of the tract, ulceration first simply septic and often later cancerous of the several areas which are subjected to constant impact or strain, infection

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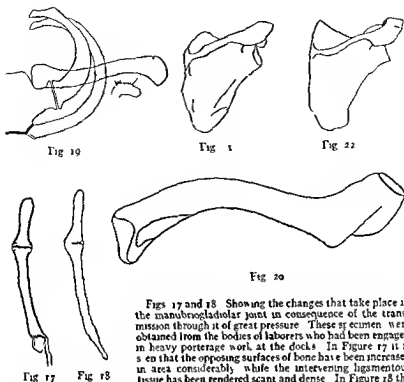
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Figs 17 and 18 Showing the changes that take place in the manubriogladiolar joint in consequence of the transmission through it of great pressure. These specimens were obtained from the bodies of laborers who had been engaged in heavy portage work at the docks. In Figure 17 it is seen that the opposing surfaces of bone have been increased in area considerably while the intervening ligamentous tissue has been rendered scant and dense. In Figure 18 the joint has been almost completely obliterated by being bridged over in front and by the formation of masses of bone in the ligament posteriorly.

Fig 19 Representing the left first and second costal arches with the manubrium clavicle and coracoid process of a laborer. The manubriogladiolar joint is amphiarthrodial in character while the joint that has developed in the ossified first costal cartilage is freely arthrodial. The position of the costoclavicular articulation is indicated by the dotted outline on the first arch. On the upper surface of the coracoid process the facet which articulates with the clavicle forming the coracoclavicular joint is similarly indicated.

Fig 20 Representing the under surface of the clavicle with the articular facets which correspond with those on the costal arch and coracoid process.

Fig 21 Scapula of shoemaker

Fig 22 Scapula of deal porter

simple or complicated by careful attention to diet and habit while in suitable cases operative interference affords results which would seem to be little short of miraculous.

As the result of observations which have now extended over many years I am exceedingly impressed by what I believe is the invariable sequence of cancer and intestinal stasis. In my opinion there are two factors in the causation of cancer as we see it in civilization namely the mechanical and the toxic.

It is not till these factors have produced sufficient degenerative change in the tissues of the body that they become a soil or medium

in which the cancer organism can grow. This organism cannot grow in a healthy organ.

I have observed cancer imposed on the mechanical and toxic results of chronic intestinal stasis so invariably that I am convinced that the sequence I have described is true in every particular.

I have been equally impressed by the absence not only of cancer but of all the other direct and indirect results of stasis as we see them in civilization in such communities as do not suffer from chronic intestinal stasis.

Our only hope of preventing cancer is by obviating the development of chronic intes-

In the course of our temperature measurements we found that when the abdomen was opened even if the liver itself was not directly exposed its temperature fell from $1\frac{1}{2}$ to 3 degrees or more and the impairment of the organism as a whole is a result of this lowered liver temperature was indicated by the fact that the temperature of the brain also fell from 1 to 3 degrees. This progressive fall in the temperature of the brain in these cases was identical with that which followed the removal of the liver. Moreover in animals under ether anesthesia a similar lowering of the temperature of both the liver and the brain was observed. Under nitrous oxide anesthesia on the other hand the temperature of the brain and of the liver was but little altered. A lowered blood pressure induced by hemorrhage also lowered the temperature of the brain and of the liver. That the organism as a whole cannot function in the absence of the liver function also was demonstrated by the lack of response of the brain to the injection of adrenalin after the liver had been removed. That is normally the brain responded to the injection of adrenalin by an immediate increase in temperature of from 0.5 to 1 degree but after the removal of the liver the injection of adrenalin produced but little or no change in the temperature of the brain. In view of these findings one can well understand why the mere exposure of the abdominal viscera may cause death in a very sick patient even if no operation has been performed and no general anesthetic has been administered.

We can understand also why the addition of the general anesthetic and of the operative procedure to the exposure of the intestines may cause the death of the patient who may not be so desperately ill.

This fatal sequence of events was illustrated on a large scale during the War by the effects of abdominal operations performed during the winter months in the front line hospitals where but few soldiers survived an abdominal operation especially when the operation required a wide exposure of the abdominal viscera. It apparently made no difference how skillfully the operation was performed.

Another remarkable fact established by our laboratory research was that the introduction

or application of heat within the abdomen which in most of our experiments was accomplished by the introduction of hot water into the stomach produced not only an immediate rise in the temperature of the liver but also a rise in the temperature of the brain and of special significance was the observation that the rise in the temperature of the brain occurred one minute or even more before the increase in the temperature of the liver was noted.

It would appear therefore that the application of heat to the liver by conserving the function of that organ should counteract the effect of the exposure of the viscera in an abdominal operation upon any patient and in particular in operations on the liver or on the bile ducts.

As stated above in the past attempts have been made to meet this requirement by hot water pads, hot tapes, the use of the hot water mattress and a superheated operating room but none of these methods has satisfactorily met this crucial need.

Recently it occurred to me that the application of diathermy would be an ideal method for holding the temperature of the liver at or above the normal level. The principle of diathermy is that the passage through the tissues of a current from a specially devised apparatus heats the tissues. Therefore it occurred to me that if one pole of the diathermy apparatus were placed upon the lower chest on one side and the other brought opposite the dome of the liver then the current would pass through the upper abdominal organs including the liver and since this current would be continuously applied during the operation the temperature of the liver and of the abdominal viscera in the track of the electric current would be maintained at or above the normal regardless of the exposure of the intestines. It must be borne in mind that on account of the enormous spread of the capillary veins and arteries very near the surface of the viscera the blood in the whole splanchnic area almost immediately assumes the temperature of the air to which it is exposed. It is almost as if the blood in one part of the circulation were spread out in a thin layer on a great table and were then

we have established a new society in Great Britain with the object of endeavoring to carry into effect the several principles enunciated in this address. It is called 'The New Health Society'. It is supported by a large number of the most distinguished lay scientific and medical people in Great Britain who are intensely interested in promoting the health, happiness and well being of the people and in the elimination of the ill health and disease which they believe are avoidable.

What I would ask you to do is to make a similar society in America and to call it 'The New Health Society' dedicated to the memory of the great man whose name and fame we are now gathered together to honor and revere. In that way the name of Murphy whose whole life was devoted so unselfishly to helping his fellow creatures will live forever and will stand for all that is great and good in humanity.

In future let the subject of the Murphy Oration be The Prevention of Disease.

Could any man wish for a grander monument or a nobler epitaph!

COMMENTS ON ILLUSTRATIONS

The illustrations in this article form excellent examples of the results of the peculiarization of function in laborers and afford indisputable evidence of the truth of the law which I have formulated.

In order to obtain a thorough insight into chronic intestinal catarrhs, it were necessary to become thoroughly familiar with the manner in which the skeleton and soft parts react when the mechanical relation of the individual to his surroundings differs from the norm.

Figures 2, 3, 4, and 5 show the manner in which after a fracture of the humerus with displacement of fragments the half of the humerus is restored by a process of crystallization along the line of force the portion of the old half within the area of the lines of force being completely absorbed.

Figure 6 is the normal spine and part of the ribs of a brewer's drayman. It represents the attitude which the man assumed in a single occasion of fixed and exaggerated flexion in order to carry a barrel of beer on his right hip.

Figures 7 and 8 show the change which the spine of the coal heaver undergoes in consequence of his very laborious occupation. The bodies of the vertebrae are altered in form and their margins have been united to one another by bony ridges of dense ivory-like bone.

Figure 9 represents the sacrum of this laborer in section. Note the displacement of the fibrocartilage, the forward displacement of the last vertebra producing the condition commonly called 'pondillo', that is the division of the arch of the fifth lumbar vertebra into three separate parts and the arched development of the bodies and spinous processes of the lumbar and sacral vertebrae.

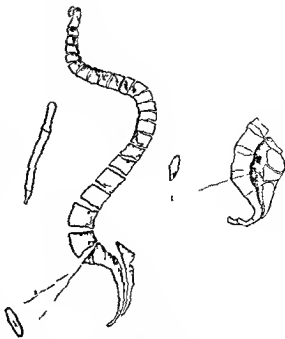


FIG. 29 (left) Spinal column of old man.

FIG. 30 Lower part of spine of feeble old subject.

Figure 10 shows the somewhat similar changes which take place in the lumbosacral joint of a coal porter, the ankylosed joint of the coal heaver being replaced by a typical arthral joint. This results from this laborer having to lift logs from the ground and to deposit them there. Contrast these variations with the appearance in a laborer whose occupation entailed his carrying load in front of his trunk as in Figure 11.

Figure 12 shows some of the changes that develop in a man who carries loads upon his head. Figure 13 shows the upper part of the spine in action. Figures 14, 15, and 16 show parts of the spinal column of a coal trimmer. Figure 15 shows the manner in which the fourth lumbar vertebra has been divided in the very forcible rotation of the trunk which occurs in this occupation. Figure 14 shows the development of the fourth vertebra in position with development of a synovial cavity in the fibrocartilage between the fourth and fifth vertebrae. Figure 16 shows the manner in which the head of the first rib is secured by a bony shelf in order to enable the action of the shovel to be carried out most effectively.

Figures 17 and 18 show the changes which are produced in the manubriosternal joints in laborers who carry heavy loads upon the back or shoulder.

Figure 19 shows the manner in which the first costal cartilage reacts to the tremendous strain to which it is exposed. The cartilage becomes converted into bone and an arthral joint is developed in it. In the same figure are seen the new joints which form between the clavicle and the first costal arch and the coracoid process. In Figure 20 the situation of these developments is shown on the under surface of the clavicle.

Figures 21 and 22 represent the scapulae of an aged shoe maker and of a coal porter. Note the remarkable differences in the shape of these bones in consequence of

MUSCLE AND FASCIA SUTURE WITH RELATION TO HERNIA REPAIR

By A. R. KOONTZ, M.D., BALTIMORE, MARYLAND
Fellow of the Surgeon General's Laboratory of the Johns Hopkins Medical School

BELCAUSI of the frequency of the occurrence and also the comparative frequency of recurrence inguinal hernia is ever a live and interesting subject. The percentage of recurrences given by various surgeons who have followed up their cases and compiled statistics varies widely. This difference is probably not so much due to a variation of operative procedure among surgeons or to a lack of skill as to faulty follow up methods and varied statistical procedures. Whatever the real percentage of recurrence is and this is difficult to determine it is conceded by many to be disconcertingly high.

This admittedly high percentage of recurrence has led to many modifications of the original operations of Halsted (1889) and of Bassini (1890) for the radical cure of inguinal hernia.

In all operations for inguinal hernia one of the principal factors considered requisite for a cure is the effectual repair of the defective abdominal wall. In this repair our chief reliance for many years has been the suture of the internal oblique muscle and conjoined tendon to Poupart's ligament.

Is our reliance in this method of repair justified? Some operators (Coley and others) declare that in their operation for recurrent inguinal hernia they invariably find the internal oblique muscle firmly united to Poupart's ligament. On the other hand it is claimed by Seelig and others that in their operations for recurrent hernia Poupart's ligament is generally found smooth and glistening and entirely free from muscle attachments.

That this subject is a matter of importance in the cure of inguinal hernia goes without saying. Marchand in his classic work on wound healing fails to mention the union of muscle and fascia although he mentions almost every other conceivable condition of wound healing. Realizing the importance of

the subject Seelig and Chouke recently conducted a series of experimental studies on animals with a view to settling the question of the union of muscle and fascia. They used dogs and sutured a reduplication of the fascia lata without tension to the underlying muscle. In their interesting and copiously illustrated article they conclude that "normal muscle will not unite firmly with fascia or ligament." It is therefore a useless procedure to suture the abdominal muscle to Poupart's ligament in the hope of buttressing a weak or ruptured abdominal wall. As fascia unites well with fascia they further conclude that the only logical course to pursue is to utilize some type of operation which depends upon fascia to fascia approximation for the repair of the defect.

The matter is of so much importance and the results and conclusions of Seelig and Chouke so revolutionary that it was felt that more experiments should be attempted in an effort to throw additional light on the subject. To this end we have performed 37 operations on dogs suturing muscle to fascia in several ways.

Most of the operations performed were ordinary hernia operations (except that there was no sac to tie off) the central feature of which was the suture of the internal oblique muscle to Poupart's ligament. The normal relation of these parts in the dog are shown in Figures 1 and 2. It will be seen that the angle formed by the internal oblique muscle and Poupart's ligament is greater in the dog than the angle formed by these structures in man. Therefore more tension is required on sutures which draw these parts into apposition in the dog than in man. Both catgut and silk suture material was used and mattress and interrupted sutures in different cases. The animals were sacrificed at intervals varying from 1 week to 9 months from the date of operation.

EXPERIMENTAL HYDRONEPHROSIS, ARTERIAL CHANGES IN THE PROGRESSIVE HYDRONEPHROSIS OF RABBITS WITH COMPLETE URETERAL OBSTRUCTION¹

By FRANK HINMAN MD FACS SAN FRANCISCO CALIFORNIA

AND

DUNCAN M MORISON MD FRCS (EDIN) EDINBURGH SCOTLAND

IN the mechanism of hydronephrosis arterial changes play a definite part. The degree of importance which they occupy in relation to the other causal factors cannot as yet however be fully determined. A previous contribution (1) showed the changes which occurred in the renal circulation as a whole during the development of hydronephrosis. Conclusions were drawn from experimentation on the rabbit two methods being employed for vascular study—barium

sulphate gelatine and celluloid corrosion. The intention of this article is to illustrate more fully the arterial changes as demonstrated by the latter method celluloid corrosion since by its means the altering phases are so graphically portrayed. The effect of surgical alterations in the blood supply upon the development of hydronephrosis has been presented in collaboration with Dr A B Hepler (3).

DETAIL OF EXPERIMENTAL PROCEDURE

Throughout the experimentation rabbits were employed. In one series the left ureter



Fig 1 Diagram based on celluloid corrosion preparations showing the relation of the arterial circulation to the unilobed pelvis in the normal kidney of the rabbit. A Interlobular arteries—the primary subdivisions of the renal artery. B Arcuate arteries—the arched continuations of the interlobular trunks. C Interlobular arteries—which arise from the arcuate vessels and support the majority of the glomeruli. Since these cortical radicles are the parent stems of glomeruli their condition and presence or absence may be taken as indicative of function.

From the Department of Physiology, Johns Hopkins University

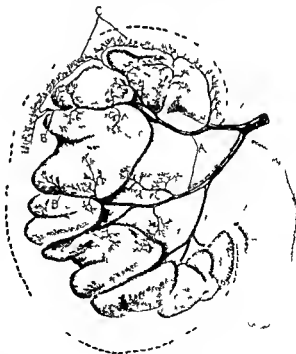


Fig 2 Diagram based on celluloid corrosion preparations showing the relation of the arterial circulation to the unilobed pelvis in hydronephrosis of 35 days duration. A Interlobular arteries. B Arcuate arteries. C Interlobular arteries.

Division of Medical Research, University of California



Fig. 3 Union between the internal oblique muscle and Poupart's ligament 2 1/2 months after operation. Three mattress sutures of No. 1 chromic catgut were used in making the sutures.

the parts concerned are brought into apposition. That this is true was shown by an experiment in which a dog was sacrificed just one week after operation and good healing was found to be in progress.

It is well known that in the repair of muscle wounds the muscle fibers themselves play

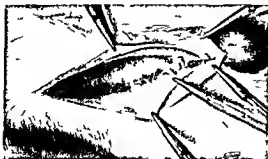


Fig. 5 Union of the internal oblique muscle and Poupart's ligament 2 months after operation. Note the downward bowing of the lower muscle bundles due to the pull of fibrous adhesions. Suture was accomplished by means of three mattress sutures of fine black silk doubled.



Fig. 4 Union of the internal oblique muscle and Poupart's ligament 1 1/2 months after operation. Three mattress sutures of fine black silk doubled were used in making the suture.

little or no part but the repair is effected by the connective tissue stroma which forms a firm scar. This scar is inseparable from the muscle, being held in close and firm contact by the innumerable ramifications of the connective tissue stroma among the muscle fibers. With this in mind in three of our experiments before suturing the internal oblique muscle to Poupart's ligament we cut away a narrow strip of the surface of the muscle to be placed in apposition to the ligament and then sutured the raw surface to the ligament. The amount of fibrous union and scar tissue formation resulting in these cases was greater than in the others. This is what one would naturally expect as fibers of the ligament and the various fibrous components of the muscle are thus brought into more active contact and the fibers of the ligament incorporated in the scar with which the injured muscle is healed.

If then as these experiments clearly show union does take place between muscle and fascia how are the negative results of such reliable workers as Seelig and Chouke to be accounted for? Their work was carried out on the dog the fascia lata being sutured to the underlying muscle. Their method was as follows. By a 3 inch (7.5 centimeter) longitudinal incision at the anterior and upper portion of the outer aspect of the thigh the fascia lata was exposed and incised longitudinally for about 2 inches (5 centimeters). A free edge of the fascia was then folded back on itself, in imitation of the

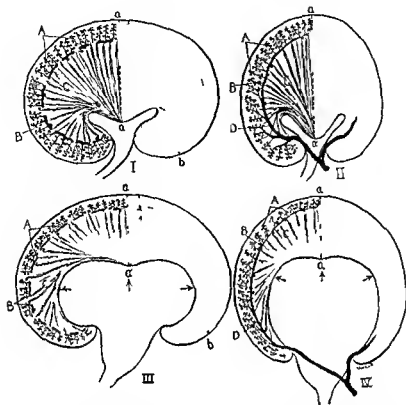


FIG. 4. Diagrammatic sections of kidneys of rabbit showing relationship of the arterial distribution to the zones of the parenchyma and the cavity of the pelvis. I and III Longitudinal sections. II and IV Transverse sections. I and II Normal relationship. III and IV Relationships when hydronephrosis has been present about 28 days.

1 Subcapsular zone or cortex corticis. 2 Cortex proper. 3 Cortico-medullary zone. 4 Medulla.

A Interlobular arteries bearing glomeruli. B Arcuate arteries. C Afferent efferent capillaries of the lowermost glomeruli. D Interlobar trunks.

In the sections of the normal kidney, I and II, observe the circumferential course pursued by the interlobar and arcuate trunks together with the polar arteries rectae (Ia, b) in relation to the cavity of the pelvis and the process of lengthening they all undergo with pelvic distention.

The vessels which pursue a radial course, the interlobular and non-polar arteries rectae (I and II a-a) show the opposite change, that is, foreshortening and tortuosity (III and IV a-a).

described (2) and the following details refer more particularly to the application of the method to the present study. A 4 part celloidin solution (4 part celloidin, 100 part acetone) deeply tinted with alkannin was injected at a pressure of 600 millimeters mercury. After maintaining pressure for 10 minutes a 50 part celloidin solution is substituted and the pressure then kept at 400 to 500 millimeters mercury for fully 12 hours. During

the entire process of injection the specimen remains immersed in water.

When it was desired to obtain pelvic and arterial casts immediately following the arterial injection the ureters were injected with a 20 part colorless solution of celloidin at a pressure of about 80 millimeters mercury. The hydronephrotic pelvis was first emptied of its contents before the introduction of the injection mass. To obtain a good well filled

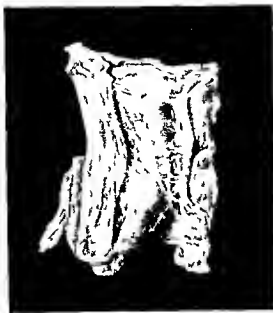


Fig 9 Animal sacrificed 2 months after suture of fascia lata to underlying muscle by method of Seelig and Chouke. Silk sutures still in place but structures are united by only a delicate membrane of areolar tissue.



Fig 10 Animal sacrificed 43 months after suture of fascia lata to underlying muscle the intervening layer of areolar tissue being first removed. Firm union of the sutured structures.

side was found to be exactly the same as that described by Seelig and Chouke (Fig 9). However on the left side the fascia lata was found to be firmly adherent to the muscle (Fig 10) and microscopic sections showed the union to be of the same type as that described above.

A discussion of this subject should not be concluded without referring to the recent experimental work of Galie and Le Mesurier. In a series of elaborate experiments which formed the basis for their use of living sutures in hernia repair these authors found that fascia readily unites with fascia the strength of the union depending upon the area of the surfaces in contact and state that

it was found that the surfaces placed in contact must be completely deprived of their sheath of areolar tissue otherwise the strength of the union will be very slight. Such surfaces should be thoroughly scraped and scarified in order that when healing does occur the new connective tissue may have a deep grip among the fibers. The importance of these observations is well demonstrated by the uniformity

of the success which attends step tenotomy and by the frequency of the failures which result from attempts to make side-to-side sutures of severed tendons. They indicate that in all operations in which it is intended to unite any of the fibrous tissues these tissues must be placed in actual contact with each other over a sufficient distance to make certain that the connective tissue which forms in the line of union will be sufficiently strong to withstand the anticipated strain. This means that in the case of aponeurosis and deep fascia the edges should be overlapped and in the case of the tendons when tenotomy is performed some form of step-operation should be employed. They further conclude that fibrous tissues heal to whatever structures they are placed in contact with by ordinary scar. The strength of this scar depends on the degree to which the surfaces which are in contact are denuded of areolar tissue and scarified and on the area of these surfaces.

Our own experimental results are in entire accord with these conclusions.

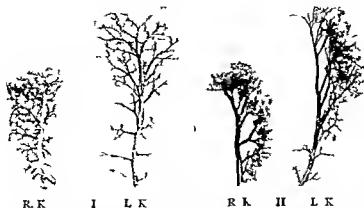


Fig. 7. Hydronephrosis duration 21 days. Celluloid corrosion preparations. Two corresponding interlobular arteries resected in their entirety from an individual preparation: the one from the right kidney (healthy) and the other from the left kidney (obstructed 21 days). The increase in length of the obstructed branch is apparent to either with its reduction in caliber and advancing obliteration of its ultimate interlobular radicles.

I As viewed from medullary aspect II Lateral view R.K. Interlobular artery from right kidney L.K. Interlobular artery from left kidney

2 The cortex proper contains the interlobular arteries which run for the most part parallel to each other and at right angles to the surface of the organ. From these interlobular arteries the vast bulk of glomeruli arise by short afferent branches.



Fig. 8. Hydronephrosis of left kidney duration 26 days. Enlarged view of outer portion of the kidney to show more clearly the lengthened and attenuated interlobular A and arcuate B vessels together with the interlobular branches C which are tortuous and foreshortened.

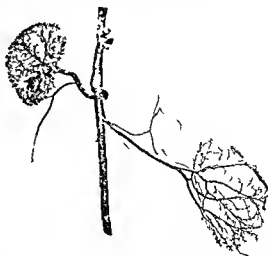


Fig. 9. Hydronephrosis of left kidney duration 35 days. Arterial injection. The alteration in the finer radicles together with lengthening and thinning of the larger branches of the left renal artery are apparent on comparison with the vasculature of the opposite healthy kidney.

NECROSIS OF THE CORPUS LUTEUM OF PREGNANCY

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AS the pathological findings in two very similar cases of pernicious vomiting of pregnancy were of such unusual nature the writers are prompted to record their observations. Brief case records are submitted.

The three well known indexes to the medical literature have been consulted regarding necrosis of the corpus luteum but nowhere have we found a reference to this subject. We also examined several of the more important papers concerning hyperemesis gravidarum and the pathology of the corpus luteum but were unable to find anything regarding necrosis of the corpus luteum. No doubt this lesion has been studied by others and probably described but the references are not accessible. Apparently then we are dealing with an uncommon lesion of some academic importance.

CASE REPORTS

CASE 1: Mrs. Aurelia G., a white woman 27 years of age, was admitted to the Elizabeth Steel Viceg Hospital April 22, 1924, on the obstetrical service of Dr. H. A. Miller and died April 24, 1924.

The complaint was persistent vomiting.

The past history was essentially negative aside from the usual childhood diseases. The menstrual periods began at thirteen years and recurred regularly every 28 days lasting 4 to 5 days. The onset of the last period which was apparently normal was February 8, 1924. The patient had been married 5 years but had not previously been pregnant.

The present illness apparently began on March 10 and was characterized by slight uterine bleeding lasting 2 to 3 hours. Soon after the bleeding she noticed nausea while preparing meals. Four days later there was again slight uterine bleeding for 2 to 3 hours accompanied by cramps. In the meantime she began to vomit. By March 25 nausea accompanied by vomiting had become very severe and 2 days later she called the family physician. The patient was put to bed and given alkali and a starchy diet. The vomiting grew rapidly worse until food by mouth was discontinued and nutrient enemata of glucose with soda were substituted. Still the vomiting persisted and the patient shortly became prostrated. The pulse rate reached 130 per minute on April 21 while previous to this time it had been 90-100 per minute. In addition glucose solution was given under the breasts and chloral

hydrate and bromides were used in the enemas but the patient remained unimproved. She was admitted to the hospital in a very serious condition.

The physical examination was limited to the pelvis because of the critical condition of the patient. The uterus was found to be the size of a grape fruit free and movable quite typical of an early pregnancy. The adnexa were normal. The cervix was posterior and soft. Blood was found on the examining fingers and there was evidence about the genitalia of previous bleeding.

Course in hospital. Because of the uncontrollable vomiting food and water were not given by mouth. Shortly after admission glucose solution was given intravenously, 500 cubic centimeters of a 25 per cent solution together with 25 units of insulin subcutaneously. The urine reacted for sugar, acetone and diacetic acid. The blood contained 200 milligrams of sugar and 23.7 milligrams of non-protein nitrogen per 100 cubic centimeters.

On April 23 the patient appeared slightly improved and craved food and water but again she was given glucose and insulin as on the day before. The blood sugar was 142 milligrams per 100 cubic centimeters and the urine contained albumin but no sugar.

By April 24 the patient appeared to be somewhat improved and food and water were permitted by mouth. There was slight uterine bleeding but no cramps. Suddenly the patient became cyanotic and the pulse became very rapid and died also the respirations. The patient died 30 minutes later. On the morning of April 24 the blood contained 166 milligrams of sugar per 100 cubic centimeters. Sugar was present in the urine but albumin was absent.

The temperature was irregular and varied from 98 degrees to 100.3 degrees F. The pulse rate was generally rapid and irregular throughout and varied from 70 to 170 per minute the latter rate being terminal.

The clinical diagnosis was hyperemesis gravidarum together with hyperglycemia, glycosuria, acidosis, slight albuminuria and uterine bleeding.

Autopsy (by M. C.) was performed 22 hours after death. The body was that of a well developed white woman who was perhaps lightly edematous. The great omentum was adherent at numerous points to the parietal peritoneum. The stomach and small intestines were markedly dilated but the int. iliac and the appendix were otherwise negative in situ. The liver was lying free and well above the costal margin. The moderately enlarged uterus was lying free in the pelvis and extended 2 to 3 centimeters above the symphysis pubis. It was soft boggy, very vascular and obviously gravid. The broad ligament veins were greatly dilated. The other pelvic and abdominal viscera were negative. No



Fig. 12 Hydronephrosis of left kidney duration 56 days. Posterior view of left kidney resected from preparation in Figure 11. The changes which have occurred at this period in the arterial distribution in relation to the distended pelvis are evident.

of displacement that is characteristic of the later phases.

It is evident that the first portions of the renal circulatory tree to be affected will be those that run radially to and from the cavity of the pelvis since these are passing in the same axis as the direction of force exerted by the distending pelvis.

With recession of the papilla the medulla becomes foreshortened and consequently the arteria recta traversing it also become foreshortened. The arteria recta however which pass from either pole run circumferentially to the cavity of the pelvis and these become stretched and laterally compressed.

With increasing pelvic distention compression of the parenchymal zones of the cortex and cortex proper lead to rapid obliteration of the former and gradual impairment of the latter from without inward. The contained vessels of the cortex—the interlobular arteries—running radial to the direction of force are affected in the same manner

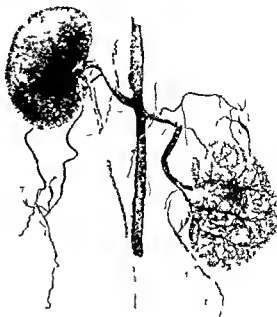


Fig. 13 Hydronephrosis of left kidney duration 49 days. Low ligation of ureter. Combined arterial and bilateral ureteral injections. The changes in the obstructed kidney are evident on comparison. The filling of the pelvis by the injection mass in this preparation is somewhat imperfect and accordingly the pelvic cast is smaller than it should be.

as the non polar arteria recta—they become foreshortened and accordingly tortuous their terminations being less resistant and more removed from the sustaining source of arterial pressure atrophy first.

Coincident with this phase there begins a gradual radial displacement of the parenchyma with consequent stretching of its constituent zones. It is manifest by a gross increase in size of the organ. An increase in circumference will be more acutely interpreted by structures which pursue a circumferential course thus the interlobar and arcuate arteries being subjected to a process of stretching become elongated. As elastic tubes on stretching lose the diameter of their lumina the e arteries show a similar reduction in caliber. This change is probably responsible for a

of the lutein cells. In certain fields practically all the lutein cells between the strand of the supporting connective tissue were dead. The cells were diffusely and deeply stained with eosin and nuclei were not seen. The cell outlines of large groups of cells were fairly well preserved while the cytoplasm of some was granular and many cells were fragmented and certain others were undergoing liquefaction. The necrosis had the appearance of a coagulative necrosis. Scattered among the necrotic cells were many neutrophilic polymorphonuclear leucocytes and occasional large mononuclear phagocytic cells. In a few scattered foci a few red blood cells were intermixed. The lutein cells otherwise were pale more or less vacuolated and granular. Many of these cells were apparently degenerating but the nuclei remained vesicular. The cells nearer the blood vessels were perhaps a little better preserved but in places the necrosis extended up to the capsule and to the blood vessels. The corpus was very vascular and in occasional small hemorrhage was observed in the supporting tissue but none were found among the lutein cells. The vessels here presented no lesions but many contained a few leucocytes. About the periphery of the corpus luteum a few well preserved paralutein cells were found.

There were a few corpora albicantia in this ovary but no follicles. No evidences of inflammatory changes were observed and the ovary was otherwise negative. Several sections of this ovary presented the same appearance.

In the cortex of the right ovary there were several small atretic follicles with many interstitial cells, the majority of which occupied the position of the theca interna and closely resembled paralutein cells. In one field numerous large and pale phagocytic cells were found about a recent corpus albicans. This ovary was otherwise negative.

The musculature of the uterus presented the normal uniform hypertrophy of pregnancy. In the decidua here and there an occasional gland was found containing thick fluid and occasional neutrophilic polymorphonuclear leucocytes. The leucocytes were not found among the decidua cells. No fibrin deposits were found aside from the normal canalized fibrin. The vessels of the uterus and decidua were numerous and large and a few small round cells were scattered about certain of the large sinuses. In addition another section showed a good deal of infiltrating hemorrhage involving the decidua which was otherwise normal in appearance.

The placental tissue was normal aside from one very tiny patch of infarction. The villi had a well defined double layer of epithelium, the inner Langhans layer and the outer syncytium.

The liver cell, especially those in the central portions of the lobules contained numerous large and small fat vacuoles. The central cells in many instances were reduced to little more than a cell membrane enclosing fat vacuoles. The immediate central cells in general were atrophic. The nuclei were not pyknotic and necrotic cells were not

found. The central capillaries were relatively large and apparently dilated but passive congestion was not a feature. The liver cells in the mid zone and periphery of the lobules revealed no special changes. Cloudy swelling was not a feature of importance. The bile ducts, portal and hepatic vessels presented nothing remarkable.

The tubular epithelium of the kidney cortex was swollen and presented more or less the appearance of cloudy swelling. This however was somewhat modified by the presence of coagulated fluid in the lumina. The cytoplasm was granular but no colloid or hyaline droplets were found. Fat vacuoles were not observed. A fair number of cells had pyknotic nuclei but the cells were not necrotic. The epithelium was everywhere intact. The glomeruli were greatly swollen and the capillaries were engorged. The capsules of the glomeruli contained much thick fluid. The vessels of the medullary portions were congested but hemorrhages were not observed.

The essential lesions found in the lungs were extensive edema and alveolar emphysema. The alveoli were dilated and even ruptured and practically all were filled with fluid and a few red blood cells. In places a few neutrophilic polymorphonuclear leucocytes were intermixed with the fluid which was indicative of a very early pneumonia. Black carbon pigment was abundant about the bronchial tree. There was also congestion.

The lymphoid tissue of the intestines was hyperplastic but there were no other changes.

The pathological diagnoses were pregnancy, necrosis of the corpus luteum, edema of the lung, fatty changes of the liver, parenchymatous degeneration of the kidneys, hemorrhages of the decidua, leiomyomata of the uterus, omental adhesions and dilatation of the stomach and intestines.

CASE 2 Mrs. Mary W., a white woman of 40 years complaining of constant vomiting was admitted to the Allegheny General Hospital September 6, 1924 on the obstetrical service of Dr. J. L. G. more and died September 13, 1924.

The patient had had typhoid fever at the age of 11. Menstruation began at 15 years recurring regularly every 28 days but recently the periods had become rather excessive. The last period was July 4, 1924. She had been married 19 years and had had 5 previous pregnancies the first 2 of which were normal. There was a probable toxemia accompanying the third pregnancy characterized by vomiting and an operative delivery followed. The last two pregnancies were accompanied by vomiting and the patient induced abortion upon herself each time by the insertion of a foreign body into the uterus. No history of marked infection followed either manipulation. Otherwise the past history was negative.

The present illness began with vomiting in the latter part of August. Within a month the vomiting was protracted and food could not be retained. There developed about the time of the vomiting

chanical interference but consequent upon it a reduction of circulatory function which provides a contributing factor in accelerating the further development of hydronephrosis until ultimately complete atrophy is attained.

3 With ureteral obstruction a renal pelvis commences to dilate. This produces progressive compression of the enveloping parenchyma. Since the finer arterial branches traverse the parenchyma in a direction radial to the cavity of the pelvis they are naturally subjected very early to a process of compression in their long axes and consequently become tortuous and foreshortened. Thus the first phase may be regarded as purely mechanical.

4 With continuing obstruction the renal pelvis assumes larger proportions achieved by definite displacement of the enveloping parenchyma. In this progressive change the gross size of the organ increases that is its circumference increases. Consequently all structures pursuing a circumferential course through the parenchyma will be subjected to a process of stretching or lengthening. Thus the major subdivisions of the renal artery

become gradually stretched. Since arteries are elastic tubes they become with stretching more attenuated and their lumina proportionately diminish. There ensues accordingly a reduced flow of blood through these channels leading to a state of ischaemia and thus by lowering tissue tone favors the progress of atrophy to its ultimate completion.

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endometritis slight hyperglycemia with glycosuria and evidence of slight acidosis

Autopsy (by D. B.) was performed 13½ hours after death. The body was that of a large well developed white woman. The skin and sclera showed a slight but definite jaundice. The moderately enlarged thyroid gland produced a noticeable fullness in the neck. The breasts, thorax and abdomen were negative. The external genitalia were bluish and multiparous. A thin brownish fluid exuded from the vagina. The body was otherwise negative externally.

The soft and moderately enlarged uterus was lying free in the pelvis, the fundus just reaching the symphysis pubis. The adnexa were essentially negative *in situ* as were the abdominal viscera. No evidence was found of peritonitis and the peritoneal cavity presented nothing of importance pathologically.

The thoracic cavity with the viscera in place was negative.

The heart weighing 250 grams was contracted and externally normal in appearance. The chambers and valves were negative. A few fair sized yellowish atheromatous plaques were found in the aorta. Otherwise the large arteries and veins were negative.

The right lung weighed 450 grams, the left 460. Both lungs were moderately edematous, exuding from the cut surfaces much frothy fluid. The dependent portions of both lungs were congested. No definite bronchopneumonia was demonstrated.

The thyroid gland weighed 125 grams, was considerably enlarged, nodular and distorted. It almost surrounded the trachea but did not compress it. Numerous adenomata for the most part made up by the enlargement, the largest of which was 4.5 by 3.5 by 3.5 to 4 centimeters. On the cut surfaces the appearance of the adenomata was typical and some were partially calcified, others showed central softening but none were cystic. The intervening tissue had large alveoli which contained much pale glassy colloid.

The liver and gall bladder weighed 1,470 grams. Externally the liver presented nothing pathological. On section the liver parenchyma as well as the capsular surfaces were uniformly dark in color. The lobules were not especially swollen and no scarring or other alterations were observed.

The gall bladder was thin walled and contained no stones and the bile ducts were negative.

The right kidney weighed 165 grams, the left 150. Aside from the purplish discoloration of congestion both kidneys were negative externally. On section they oozed much blood but both were soft. There was slight swelling of the cortex of each kidney. The pelvic structures of each were negative.

The uterus was the size of a 3 months pregnancy, symmetrical and soft. Its surfaces were smooth and glistening except for a small patch of superficial veins forming a rosette situated on the fundus. The cervix was soft and revealed a healed bilateral laceration. Thick mucus exuded from the patulous external orifices. On section of the uterus the fetus

was found floating in clear amniotic fluid. The fetal membranes and placenta presented nothing pathological. The uterine muscle and the decidua were very vascular but appeared to be normal. The cervical tissue was dense and was cut with difficulty.

The fetus was 45 centimeters crown rump length and appeared normal. The umbilical cord was not remarkable.

The right ovary was larger than the left due to the presence of the corpus luteum of pregnancy in the median pole. No gross changes were recognized in the corpus which had a uniform light yellow color. The ovarian tissue of the right ovary was solid. The left ovary was not grossly pathological.

The uterine tubes were essentially negative.

The vagina was negative.

A small firm lobulated and gray nodul 12 by 6 millimeters with the appearance of an accessory pancreas was found on the free surface of the upper jejunum. The large bowel and appendix were negative.

The bone marrow of the right femur was abundant and reddish brown in color.

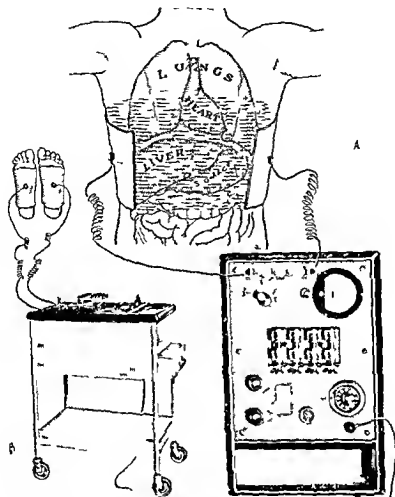
The other organs, namely the pancreas, spleen, suprarenal glands, breasts, urinary bladder and stomach revealed nothing of special importance grossly or microscopically. The lymph nodes were negative. The central nervous system was not examined.

Culture of the heart's blood revealed no growth.

Microscopic examination. The material was fixed in Zenker's fluid and stained with methylene blue and eosin.

The sections of the corpus luteum in the right ovary revealed extensive necrosis. Large patches of cells the nuclei of which were hardly recognized had undergone coagulative necrosis. Among them were scattered a few neutrophilic polymorphous clear and endothelial leucocytes. Occasional tonsil fibrin deposits and elsewhere a few red blood cells were also found among the coagulated cell. About the periphery of these large patches the dead luteal cells were undergoing fragmentation and extensive liquefaction. Nowhere however were the nuclei pyknotic. In the blood vessels which were un injured a few neutrophilic polymorphonuclear leucocytes were also found. The corpus was very vascular but there were no hemorrhages. About certain of the vessels the luteal cells were fairly well preserved and in a few places they appeared unchanged. The center of the corpus luteum was occupied by a small cavity containing coagulated fluid, the lining of which was of fibrous tissue. The supporting and capsular tissues of the corpus luteum presented nothing unusual. The few paraluteal cells about the periphery showed nothing remarkable.

A very slight chronic peripheral inflammation was found which was characterized by a few buds of organized exudate infiltrated with a few mononuclear cells. The superficial cells of the mesovarium at one point and many cells in certain of the patches of organized exudate had undergone a very definite decidual change.



Schematic drawing showing application of diathermy to abdominal operations
 A Position of electrodes during operation B Portable diathermy apparatus which can be wheeled beside or behind the patient to and from the operating room

fore it becomes of prime importance to know how the function of the liver can best be protected. This pertains to any surgical operation but it is of particular importance in abdominal operations and of prime importance in operations upon the liver and gall bladder and upon the common duct in particular.

Laboratory researches pointed the way to methods whereby the liver function could be protected against the chilling effects of exposure and its function maintained at or above the normal level during the critical first post operative hours or days. It is a well known

biophysical law that a change of one degree in temperature changes the chemical activity of either a physical or biological system 10 per cent. It follows that when the temperature of the liver is reduced one degree its chemical activity is reduced 10 per cent. Therefore when the exhaustion incident to disease such as cancer of the stomach for example has reduced the chemical activity of the liver of a patient to 10 per cent of its normal activity then if the temperature of the liver is reduced but one degree when the abdomen is opened death will follow inevitably.

certainly the result of the liberal therapeutic use of glucose solution. The acidosis as revealed by the urinalysis was obviously the result of starvation. The albuminuria was apparently not marked. The uterine bleeding was not the result of an endometritis, and perhaps might have been the onset of a threatened abortion, had the patient lived long enough. Toward the end tachycardia and later, fever developed. Unfortunately no blood pressure readings were available.

Aside from marked pulmonary edema the postmortem examination so far as the gross findings were concerned revealed little of significance. Microscopically the extensive coagulative necrosis of the corpus luteum constituted by far the most important lesion. Certain of the lutein cells near the blood vessels were not greatly altered and seemed to be somewhat protected by their position. The liver revealed fatty changes but not the usual central necrosis. The kidneys presented very definite parenchymatous degeneration but nothing especially characteristic.

In the second case the clinical picture was also that of pernicious vomiting in early pregnancy. This patient was a multipara in the third month of gestation. When the patient entered the hospital after 2 weeks of almost constant vomiting she showed evidence of desiccation and loss of weight. When she was first examined her condition was regarded as serious and the duration of the illness was less than a month. The presence of jaundice and the high non protein nitrogen of the blood were unusual features worthy of note. The rapid pulse and fever were apparently terminal events. The high red and white blood cell counts were no doubt due to concentration of the blood from the loss of fluids. The leucocytosis at least in part was possibly associated with the acute endometritis. The slight hyperglycemia and glycosuria as in the first case is to be attributed to the therapeutic use of dextrose. Here again one sees evidence of a slight starvation acidosis as shown by the presence of acetone in the urine. Albuminuria was very slight. There was no hypertension.

With the exception of edema of the lungs and the adenomatous goiter the autopsy findings were not remarkable.

The important lesions microscopically were in the corpus luteum and in the liver and the decidua. The acute decidual endometritis certainly followed the introduction of the foreign body into the uterus. The infection had not spread to any extent and apparently it was rather a low grade process. The chronic inflammatory lesions of the cervix appears to have been of long standing while the acute exacerbation and ulceration were no doubt caused by the slippery elm stick.

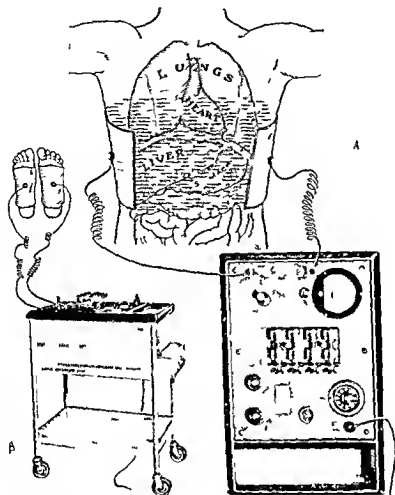
The acute ulcerative appendicitis was not extensive and of little significance.

The pathological findings in the liver were not extensive yet definite. There was a moderate degree of fatty changes in the central cells and in occasional lobules one or more necrotic cells were observed. The liver was also oedematous. The cause of the jaundice remains obscure as the liver damage was hardly sufficient to explain it. Apparently then it should be considered of extrahepatic origin.

The kidneys did not present the characteristic necrosis of the tubular epithelium but essentially a parenchymatous degeneration. The kidneys showed no evidence of nephritis and the high non protein nitrogen of the blood remains unexplained.

The massive necrosis of the corpus luteum was by far the most marked lesion found. Rather extensive liquefaction of the dead lutein cells in this case is perhaps in favor of necrosis of longer duration than is that in the first case. The necrosis in this instance as in the first case represents an uncommon local degeneration. No other ovarian tissue was affected in either case but occasional capillaries of each corpus luteum were evidently slightly injured.

Two very similar cases of pernicious vomiting of pregnancy both terminating in death revealed for the most part a similar disease condition especially of the corpus luteum. Both cases presented the rather characteristic fatty changes of the liver, however in neither instance were the livers enlarged. Only in the second case were there necrotic central liver cells and these were not numerous. Central necrosis of the liver though often observed is not a constant finding in this disease. The



Schematic drawing showing application of diathermy to abdominal operations
 A Position of electrodes during operation B Portable diathermy apparatus which can be wheeled beside or behind the patient to and from the operating room

fore it becomes of prime importance to know how the function of the liver can best be protected. This pertains to any surgical operation but it is of particular importance in abdominal operations and of prime importance in operations upon the liver and gall bladder and upon the common duct in particular.

Laboratory researches pointed the way to method whereby the liver function could be protected against the chilling effects of exposure and its function maintained at or above the normal level during the critical first post operative hours or days. It is a well known

biophysical law that a change of one degree in temperature changes the chemical activity of either a physical or biological system 10 per cent. It follows that when the temperature of the liver is reduced one degree its chemical activity is reduced 10 per cent. Therefore when the exhaustion incident to disease such as cancer of the stomach for example has reduced the chemical activity of the liver of a patient to 10 per cent of its normal activity then if the temperature of the liver is reduced but one degree when the abdomen is opened death will follow inevitably.

THE CORPUS LUTEUM AS THE SOURCE OF THE FOLLICULAR HORMONE

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SINCE Knauer (1899) proved by transplantation experiments that the action of the ovary on the genital tract was due to a hormone, a decided interest has been taken in the task of localizing the origin of this hormone in the various distinct tissues of the ovary. The follicle, interstitial cell and corpus luteum have been cited as possible sources of it.

The idea that the corpus luteum is the tissue producing the hormone of the ovary was first suggested by Born and Fraenkel (1903). They believed the corpus luteum to be responsible for the implantation of the ovum and in some way to cause menstruation. Fraenkel tested the relation of the corpus luteum to the implantation of the ovum by extirpating the corpora lutea of pregnant rabbits and noting that the pregnancy was terminated if the operations were performed in the early days of pregnancy.

L. Loeb (1907) considered the corpus luteum necessary for the implantation of the ovum because of his studies on the production of deciduomata in the uterus of the guinea pig. He found it possible to produce deciduomata in the uterus by mechanical stimulation only at one period following oestrus, namely when the corpus luteum had reached its greatest development. Loeb considers the effect of the corpus luteum to be that of a sensitizing agent rather than a factor in nutritional control as Fraenkel pointed out.

Ancel and Bounin (1910) working with the rabbit confirmed Loeb's work. They allowed females to copulate with vasectomized bucks and noticed that corpora lutea were formed and that certain changes occurred in the uterus. These changes were considered as a preparation for the reception of the ovum. That there is more than one ovarian hormone seems to be probable. However, in this

paper we are concerned only with the hormone found in the follicles and wish to ascertain whether or not this hormone is also found in the corpus luteum.

Herrmann in 1913, claimed the isolation of an unsaturated phosphatide which caused oestrus changes but later altered his opinion about the character of the substance. Fellner (1913) also claimed the isolation of the female sex hormone as a lipid. Fellner and Herrmann have since entered into a controversy as to the priority of the discovery of the hormone in the corpus luteum. Both of these men claim to have found a hormone causing hyperplasia of the genital tract in whole ovaries, corpus luteum and placenta. The test animals used in their experiments were sexually immature female rabbits.

Frank and Rosenbloom (1915) tested the action of extracts of corpus luteum by lipid solvents on the genital tract of female rabbits and found an increase in the length, diameter and weight of the uterus following subcutaneous injections. A very decided difference was noted in extracts of corpora lutea from ovaries of pregnant hogs as compared with those obtained from non pregnant animals. Extracts of the latter did not cause increase in the size of the uterus while the former gave a positive reaction. The ovaries for this experiment were collected by the packing company and it is interesting to note that the extract of corpora lutea from one batch of ovaries which inadvertently had been degreased by the packing firm gave only negative results.

Although Fellner, Herrmann and Frank and Rosenbloom all obtained positive results in inducing uterine hyperplasia with corpus luteum lipid extracts, Okunschitz (1914) could obtain only negative results with his extracts.

collected and again placed in circulation. By the passing of the diathermy current through the liver and the neighboring viscera this thin layer of blood would as it were be made to pass over a hot table so that warm blood would pass into the rest of the circulation.

In accordance with this conception we have been applying the diathermy current in certain bad risk cases. We have found that the electrodes can be put in place and the diathermy current established before the abdominal incision is made and that neither the surgeon nor the patient need be aware that such a current is passing.

We have found by actual observation that by this means the temperature of the dome of the liver can be maintained above normal throughout an operation in which the abdominal viscera are widely exposed.

The higher incidence of pneumonia after abdominal operations than after operations of an equal magnitude on other portions of the body is well recognized. In view of this fact and in view of the facts which we have cited one might well question whether this is not the result of the cooling of the blood in the important organs within the chest plus the general depressed function of the organism as a whole as the result of the cooling of the liver. We are therefore now noting whether or not the maintenance of a constant temperature in the liver and other abdominal viscera by the use of diathermy is lessening the incidence of postoperative pneumonia.

We are also using repeated doses of diathermy after operations in feeble and aged patients and after especially wide and prolonged exposure of the upper abdomen delivering the dose through the bases of the lungs as this is the area where postoperative pneumonia is initiated. In addition to the advantage of heat the increased temperature must induce a more active circulation in this area and thus increase the defense against infection.

Instead of delivering the dose directly through the bases of the lungs an effective method of maintaining the temperature of the whole organism and accordingly promoting circulation and general metabolism is secured by the passage of the diathermy current through the whole body by applying the terminals to the feet. The diathermy apparatus is so arranged that the terminals can be applied before the patient leaves the operating room the apparatus being wheeled beside or behind the surgical carriage to the patient's room where it remains as long as this treatment is indicated.

Comparable to the effect of the direct application of heat by the passage of an electric current through the resistant tissues is the application of radiant heat energy by means of the Alpine or quartz mercury lamp. Just as this has been found effective in cases of lowered resistance of tuberculosis and so forth we have found that it is equally effective when applied to anæmic and cachectic patients whose general resistance has been lowered by prolonged wasting diseases.

By the application of these two physical methods which have long been used by the physiotherapist in certain conditions the surgeon has increased his armamentarium for the effective treatment of bad risk patients especially for the bad risk abdominal case.

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TABLE II—INJECTION OF OVARIAN EXTRACTS INTO NORMAL IMMATURE RABBITS

Litter mates	Rabbit No.	Preparation No.	Tissue extracted	No. of days injected	Amount of extract in cc. injected	Age of rabbit	Length in mm. of uterine horn	Diameter of uterus in mm.	Condition of internal genitalia	Result of operation
A	857	143	Red corpora lutea	7	77 gm.	55	50	1	Uterus oviduct and vagina small and anemic	-
A	858	144	Liquor folliculi	7	77 gm.	55	80	4	Ovaries and tubes small uterus and vagina large	++
A	859	145	Remains of ovaries from which No. 143 and No. 144 were taken	7	77 gm.	55	60	3.5	Uterus hyperæmic and slightly enlarged	+
A	856		Control animal		0	55	60	3	Uterus slightly pink, vaginal wall thin	-
B	853	147	Residues from pregnant corpora lutea No. 121 No. 123 and No. 129 (See Table I)	5	67 gm.	6	40	2	Uterus and tubes small and white	-
B	852		Control animal		0	6		1.5	Uterus small	-
C	816	447	No. 147 (see above) and No. 110	6	75 gm.	7		2	Uterus small and white	-
C	819	110	Liquor folliculi (highly purified) Total solids 8 milligrams	6	0	7		4	Uterus enlarged and slightly pink	+
C	818	257	Liquor folliculi and corpora lutea No. 110 and No. 147	6	0	7		4.5	Uterus enlarged and slightly pink	+
C	817		Control animal		0	7		1.5	Uterus small and white	-
D	820	147	Corpora lutea (see above)	4	50 gm.	45		0.8	Uterus very small animal died 4th day with diarrhea	-
D	821	110	Liquor folliculi (see above)	4	10 gm.	45		2.5	Uterus and vagina enlarged and slightly pink	+
E	822	158	Corpora lutea red mixed	8	80 gm.	7		3	Uterus hyperæmic animal died Cause?	+
E	824	110	Liquor folliculi (see above)	8	25 gm.	7		5	Uterus very large, slightly hyperæmic	++
E	854		Water soluble commercial preparation of whole ovaries	8	0	7		1.5	Uterus small and anemic	-
E	825		Control animal		0	7		2	Uterus small and anemic	-

comparison of the condition of the genital organs of injected and uninjected litter sisters. For the rat we used the test originated by Stockard and Papanicolaou (1917) for the guinea pig and described as being equally suited for the rat (Long and Evans 1922) mouse (Allen 1922) opossum (Hartman 1923) and monkey (Corner 1923). The test consists essentially in the examination of the vaginal smear which presents a very characteristic picture in the various phases of the estrous cycle. It is possible by this method to follow closely in the living animal changes occurring in the genital tract.

In our experiments injections were made in three portions during the day the injections usually being about 4 hours apart. Tests of 42 extracts of corpus luteum were made in varying amounts. In no case was there a positive result with corpus luteum extract regardless of the type of corpora lutea or quantity used. However by a perusal of the protocol it will be noted that from liquor folliculi and whole ovary extracts positive results were always obtained with the extract of 0.5 to 3.0 cubic centimeters of liquor folliculi, while the extract of 10 to 60 grams of corpus luteum gave negative results. It will be noted that the

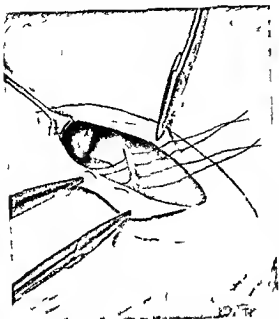


Fig. 1. The fascia of the external oblique is shown split and held back by Halsted clamps revealing below the normal relationship of the internal oblique muscle and Poupart's ligament in the dog. Mattress sutures are in place ready to be tied.



Fig. 2. Both inguinal canals are here laid open. The left side shows the normal relationship of the structures as in Figure 1. On the right side the internal oblique muscle had been sutured to Poupart's ligament with 3 mattress sutures of No. 1 chromic catgut 2 months previously. The resulting union is clearly shown.

In these operations as a rule 3 mattress sutures of silk or catgut were used to suture the internal oblique muscle to Poupart's ligament. The various structures of the region were first separated from each other by blunt dissection with the handle of a knife or a piece of gauze but were not traumatized any more than in the ordinary hernia operation in man. The conjoined tendon did not furnish the firm anchorage for the lower sutures that it does in man as this structure is of negligible importance in the dog. The fascia of the external oblique was sutured in some cases by a simple continuous stitch in other cases it was closed by overlapping the edges and careful suture by interrupted stitches. However it was shown when the animals were sacrificed that the method employed for the suture of the fascia of the external oblique had no effect on the union obtained between the internal oblique muscle and Poupart's ligament. Examples of the type of union obtained between these last named structures are shown in Figures 2, 3, 4 and 5. It will be seen that there are definite bands of

connective tissue uniting the ligament with the muscle and that in some places the pull of these bands is strong enough to draw bundles of muscle fibers away from their fellows and cause a bowing forward toward the ligament. The union of these structures was of so firm a nature that they could not be pulled apart without tearing the muscle.

Microscopic sections reveal the nature of this process of union between muscle and fascia. The union is the result of the interlacing and growing together of connective tissue fibers from Poupart's ligament and of similar fibers from the epimysium, perimysium and endomysium of the muscle. We have in effect then here a fascia to fascia union. The nature of this union is clearly shown in Figures 6, 7 and 8.

In one dog the iliac artery was injected with India ink before the structures were removed for microscopic section. On studying sections from this material under the microscope capillaries could be seen passing freely from the muscle coverings into Poupart's ligament. Further proof of the newly established continuity of these structures was thus established.

It is to be expected that Union such as that just described will take place very soon after

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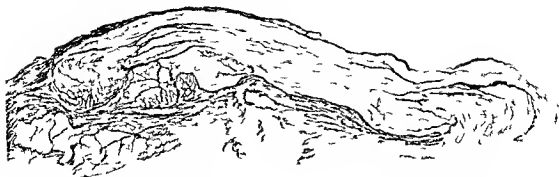


Fig. 6 Union of muscle and fascia. Transverse section through area of union shown in Figure 5 enlarged 25 diameters. Van Gieson's connective tissue stain.

reflection of the external oblique fascia to form Poupart's ligament. The reduplicated edge of fascia was then sutured to the underlying muscle. This suture of muscle to fascia was always carried out so that there was no tension whatsoever on the sutures in order to obviate all possibility of the separation of fascia from muscle by pull. When the animals in which this operation was performed were sacrificed it was found that the fascia was widely separated from the muscle to which it previously had been sutured. A very thin and translucent membrane of areolar tissue

bridged the gap between the edges of the fascia and the muscle.

On attempting to repeat the operation of Seelig and Chouke it was found that normally there is an intervening layer of areolar tissue between the fascia lata and the underlying muscle and the thought at once occurred to us that this was probably the reason for the nonunion of the two sutured structures. We therefore operated on both thighs of 4 dogs. On the right side of each we repeated the operation of Seelig and Chouke. On the left side of each we performed the same operation except that we first removed the intervening layer of areolar tissue and then sutured the fascia lata to the underlying muscle. On sacrificing these dogs the result on the right

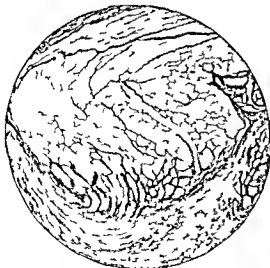


Fig. 7 A magnified portion of the transverse section shown in Figure 6 enlarged 50 diameters showing details of the union of the fibrous components of the muscle with Poupart's ligament.

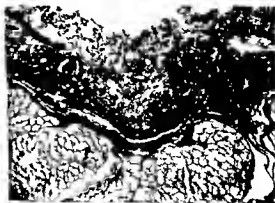


Fig. 8 Union of muscle and fascia. Photomicrograph of section through internal oblique muscle and Poupart's ligament 3 months after operation. Fine black silk doubled used as suture material. Van Gieson's stain 60X.

Retrodisplacement of the uterus may well be divided into two classes the congenital or developmentally defective and the acquired types. The associated symptom producing condition may be similar in both types but there are differentiating details that must be recognized before proper judgment and treatment can be secured.

In the first or smaller group are those types found most frequently in unmarried girls or nulliparous women. This group is more apt to be of the non symptomatic type and for that reason usually not associated with other pathological conditions requiring treatment. As Stacy (12) has shown uncomplicated retroversion occurs in about 20 per cent of unmarried women and there is little difference in the character of menstruation and incidence of symptoms in cases of retroposition and in cases of anteversion of the uterus. The congenital retroposition is quite apt to be a local manifestation of a constitutional muscular and fascial deficiency. A general endocrine dysfunction and a genital insufficiency are frequently observed.

However the second group the acquired type, is the large group that demands intensive study and offers great promise both in the matter of prophylaxis and of permanent cure. This is so because this type comprises by far the larger number of cases of retrodisplacement and because it may be said that the acquired type is always associated with other pelvic conditions and therefore is symptom productive or potentially so. Even when no gross pathology can be demonstrated in careful gynecological examination and when competent orthopedic and neurologic study fails to account for symptoms it is possible to assume the presence of some definite associated lesion. An example of this is frequently seen when the pelvic examination is negative except for mobile retroversion yet the complaint backache or menorrhagia is relieved by a properly applied pessary and the operative findings reveal definite varicocele of one or both broad ligaments and an associated hyperplastic endometritis. Admittedly it is in the apparently uncomplicated mobile displacement that the most careful study and expert judgment must be employed.

PREVENTION

Little can be done in the prophylaxis of retroposition of congenital origin. General hygiene diet, proper exercise care of the bowels more careful supervision of girls during puberty with perhaps the occasional exhibition of glandular therapy, constitute the conservative palliative management of this condition.

It is fair to assume as Gellhorn (6) has insisted that every acquired retrodisplacement is pathological even if uncomplicated and must produce symptoms sooner or later. In the great majority of cases acquired displacement is preventable by proper treatment following the termination of pregnancy. Any measure directed toward the rapid resolution of traumatic injury the result of labor will lessen the likelihood of malposition. Frequently as Baldy (1) and others maintain the related pathology is causative of the displacement. A lacerated cervix or perineum is often the cause of the subinvolution and consequent retroposition. Even in easy spontaneous delivery it must be assumed that definite damage to the structural anatomy of the birth passage is incurred. Overstretching and solution of continuity of the muscular and fascial layers may be submucous and yet often of greater etiological significance than the evident laceration through the mucosa. The ease with which the mucous membrane and fascia slides and assumes another and lower permanent attachment is obvious.

Although Howard Kelly in a recent 'Review of Thirty Years of Gynecology' declared that he rarely employed that obsolete instrument the vaginal pessary "itphere" today is greater than in those early days when it was used as a curative agent. There is no better method of differential diagnosis than the employment of a well fitting pessary as a try out to determine the ability of maintained reposition of the uterus to relieve the symptoms complained of. If the pessary affords relief one can expect a proper operative restoration to do as much or more. When manual replacement of the uterus is not easily accomplished a proper pessary and postural exercise will often correct an erroneous diagnosis of adherent displacement. Contra



Fig 6 Union of muscle and fascia. Transverse section through area of union shown in Figure 5 enlarged 25 diameters. Van Gieson's connective tissue stain.

reflection of the external oblique fascia to form Poupart's ligament. The reduplicated edge of fascia was then sutured to the underlying muscle. This suture of muscle to fascia was always carried out so that there was no tension whatsoever on the sutures in order to obviate all possibility of the separation of fascia from muscle by pull. When the animals in which this operation was performed were sacrificed it was found that the fascia was widely separated from the muscle to which it previously had been sutured. A very thin and translucent membrane of areolar tissue

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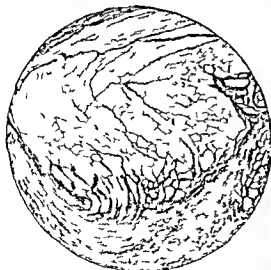


Fig 7 A small portion of the transverse section shown in Figure 6 enlarged 150 times showing detail of the union of the fibrous components of the muscle with Poupart's ligament.

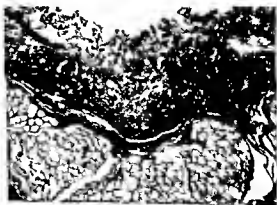


Fig 8 Union of muscle and fascia. Photomicrograph of section through internal oblique muscle and Poupart's ligament 3 months after operation. Fine black silk doubled used as suture material. Van Gieson's stain 60X.

The operation of greatest assured value is that of the modified Simpson or Montgomery subperitoneal technique which restores the uterus to its normal position with a minimum departure from the normal anatomical relations and physiological functions. Obviously any operative technique to be competent must include efficient care of all the associated pathology and contributing factors. A relaxed pelvic floor must be restored, a diseased cervix properly repaired, adnexal disease removed. Descensus of the bladder ranging from slight relaxation of the anterior vaginal wall to marked cystocele is so frequently present as to warrant the routine elevation of the bladder upon the anterior uterine surface in the manner described by Keefe (9). In extreme cases it is quite feasible to free the bladder from its cervical and vaginal attachment and perform an internal "interposition" operation with sterilization if in the child bearing period and the round ligament shortening of the Simpson Montgomery method. Occasionally it is well to shorten the sacro uterine ligaments or even obliterate the pouch of Douglas. Failure to account properly for any defect may jeopardize the success of the entire operative effort. It is fair to say that the retroposed uterus can be restored to its normal position by this Simpson Montgomery technique modified to suit, with a minimum operative risk and with a maximum expectation of permanent cure. If properly done no contra indication to future pregnancy exists, no dystocia occurs, nor is recurrence after subsequent labor likely if competent post partum observation and care be provided.

There are cases in which the round ligaments are so deficient as to render the Simpson Montgomery technique inadvisable and at other times it is anatomically impossible to bring the fundus forward in this manner. Frequently there is associated in these circumstances a prolapse of both adnexa with

marked varicose veins of both broad ligaments and the operation of choice is that of the Baldy Webster type which indeed is the most efficient means of providing adnexal elevation and support.

CONCLUSIONS

- 1 Congenital retroposition is rarely symptom productive and therefore it seldom requires treatment.
- 2 Symptom productive retroposition of the uterus of the acquired type is most common among women who have been pregnant.
- 3 Symptom productive retroposition will show on careful examination as occluded conditions and the diagnosis will quite certainly be confirmed at operation.
- 4 More efficient and extended post partum observation and care will greatly lessen the incidence of acquired retroposition.
- 5 The vaginal pessary when properly used is an instrument of undoubted value and should be more frequently used to promote proper post partum involution.
- 6 Any operation that carries with it the risk of intestinal obstruction or uterine dystocia should be condemned.
- 7 The Simpson Montgomery technique with proper care of associated defects offer the best prospect of cure.
- 8 In a few selected cases the Baldy Webster technique is superior.

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SUMMARY

1 The internal oblique muscle and Poupart's ligament unite firmly in the dog when these two structures are brought into apposition by suture. This is in spite of considerable pressure on the sutures.

2 The cutting away of a small strip of the edge of the internal oblique and thus making a raw surface tends to make the union firmer than usual.

3 When the fascia lata of the dog is sutured to the underlying muscle these structures unite firmly provided the intervening layer of areolar tissue has been removed.

4 Microscopic sections show that this union of muscle to fascia is accomplished by the growing together of the connective tissue fibers of the plane sheet of fascia (Poupart's ligament or fascia lata) with the fibers of the epimysium, perimysium and endomysium.

CONCLUSIONS

These experiments show that muscle unites with fascia by the union of the fascia with the fibrous components of the muscle. The strength of this union depends upon intimacy of contact of the fascia with the fibrous com-

ponents of the muscle. It is necessary therefore that both muscle and fascia be stripped of areolar tissue before they are sutured together. Still better results are obtained if raw surface of muscle is sutured to fascia.

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TABLE I—CHIEF COMPLAINTS AND OBVIOUS SIGNS AT THE TIME OF ADMISSION

Symptom and sign	Treated by diet		Treated by operation	
	Cases	Per cent	Cases	Per cent
Profuse menstruation	95	28.0	63	25.0
Irregular bleeding	63	18.0	22	8.8
Pelvic pain on pressure	18	3.0	13	5.2
Lower abdominal pain	36	10.0	38	15.2
Cystitis or urinary symptoms	8	2.0	3	1.0
Dysmenorrhea	8	2.0	16	5
Prolapsed uterus	3	0.6		
Backache	5	1.5		
Vaginal discharge	7	2.0		
Frequent miscarriages	1	0.3		
Pseudocyesis	1	0.3		
Weakness and fatigue	12	3.4	12	4.8
Presence of tumor noted	20	6.0	57	23.0
Symptoms unrelated	97	28.0	59	23.6
Tumor found in routine examination without symptoms	5	(20.5)	3	(24.6)

each major group the average lapse of time since the menopause was 3.8 years. One patient aged 76 who had passed through the normal menopause at 52 had first noted the pelvic tumor 4 years before her treatment at the Mayo Clinic and during these 4 years the growth had been quite rapid. Instances of this type discredit the hypothesis that the growth of fibromyomata is stimulated by an ovarian hormone or interaction of ovarian and uterine tissues. Bland Sutton says that fibromyomata arise in the uterus only during menstrual life that after the cessation of menstruation they cease to grow and come diminish in size. Although the growths may have been present during menstrual life the following 2 cases cited by Trostler indicate that the excitation to growth may occur long after the ovaries have ceased to function.

A patient for whom a bilateral salpingectomy and oophorectomy had been performed at the age of 33 presented 3 years later a large smooth fibromyomatous uterus extending to within 7.5 centimeters of the umbilicus. The second patient, both of whose ovaries had been removed at the age of 35, had a fibromyomatous uterus extending to the umbilicus when she was 40.

Gibson observed the appearance and growth of a uterine myoma about 15 centimeters in diameter within 7 months after the removal of both ovaries. That the removal of ovarian

TABLE II—TYPE OF MENSTRUATION

Symptoms and signs	Treated by radiation		Treated by operation	
	Cases	Per cent	Cases	Per cent
Profuse and prolonged	183	53.0	95	38.0
Irregular	123	35.7	43	16.8
Scanty	13	3.8	11	4.4
Regular moderate	51	14.8	82	32.8
Continuous	11	3.0		
Painful	82	23.8	82	32.8
Past menopause with return of bleeding	11	3.0	14	5.6
Pelvic pain	67	16.0	73	29.0
Total	344		250	

hormones alone is not sufficient to reduce a fibromyomatous mass is indicated by the case reported by Gellhorn of a patient aged 64 who although bilateral oophorectomy had been performed as treatment for fibromyomatous tumors when she was 30, presented a mass still about 18 centimeters in diameter after the intervening 34 years.

The theory of ovarian stimulation of fibromyomatous growths has been the basis of the school of radiological technique commonly described as the German school which seeks to suppress ovarian function in the hope that the resultant physiological reactions will reduce the uterine tumor. Opponents of this method contend that the roentgen rays affect directly the neoplastic elements of the tumor and that the successful results with the German method of treatment are due to the inclusion of a part or all of the tumor in the fields of treatment (Table I).

Increased or prolonged menstrual flow is obviously the most common indication of the presence of fibromyomatous growths. It is well known that the fibromyomata may be symptomless for many years (Table II).

Ewing mentions sterility as one of the possible causes of fibromyomatous tumors. Among the large number of patients having fibromyomata Young found sterility in 31 per cent while for all women sterility was found in about 10 per cent. It is more generally believed that the fibromyomata are a cause of sterility by mechanical irritation or obstruction rather than a result of it (Table III).

It has heretofore been considered that fibromyomata presenting a mass larger than



Fig. 1 Low power photomicrograph of corpus luteum of Caesarean section showing wide spread coagulative necrosis. Practically all the luteal cells are necrotic.



Fig. 2 High power photomicrograph from the center of the upper half of Figure 1 showing moderate leucocytic infiltration among the necrotic luteal cells.

evidence of peritonitis was found and there was no excess of peritoneal fluid.

Both lungs were found lying free greatly distended and apparently very oedematous. The thoracic viscera were otherwise negative in place.

The heart weighed 100 grams was contracted and normal externally. The valves and chambers were negative. The aorta aside from a few fatty streaks was negative.

The right lung weighed 450 grams the left 345. The large bronchi and the cut surfaces of lungs exhibited much blood tinged frothy fluid. The lungs otherwise were negative aside from dependent congestion.

The liver and gall bladder weighed 1060 grams. The liver was small, smooth and pale in color with a few whitish capsular scars on the inferior surfaces. On section the color was slightly yellowish and homogeneous throughout. The consistency was normal. No scarring of the parenchyma nor passive congestion was observed.

The gall bladder presented nothing abnormal and bile duct was essentially negative.

The right kidney weighed 125 grams the left 125. These organs were smooth and slightly congested. The cortex of each was swollen and dull. The pelvic structures of each kidney were negative.

The uterus presented the typical appearance of an early normal pregnancy. It was moderately enlarged, symmetrical, soft and smooth. It measured 13 centimeters from cervix to fundus, 9 centimeters between the cornua and 6 centimeters in thickness. On the posterior surface there were three small subserous myomata. The cervix presented nothing abnormal and the canal was tiny.

On section of the uterus the small fetus, umbilical cord, placenta and membranes were found intact and the appearance was normal in every respect. The amniotic fluid was clear. The endometrium and myometrium presented nothing remarkable. The fetus measured 6 centimeters crown heel length.

The ovaries were normal in size and shape and presented nothing pathological. The corpus luteum of pregnancy was found in the left ovary which measured 17 by 12 millimeters on the cut surface. It was yellow in color and presented no recognizable gross changes.

The uterine tubes were congested but otherwise negative.

The vagina was negative.

The upper small bowel was considerably distended but smooth and glistening. The lymph follicles and lymphoid patches of the ileum were prominent appearing as whitish gray slightly elevated firm structures. The appendix and the large bowel were negative.

The stomach aside from marked dilatation was negative.

The other organs, namely the spleen, pancreas, urinary bladder, suprarenal capsules, breasts and also the lymph nodes revealed nothing of especial importance grossly or microscopically. The central nervous system was not examined.

Culture of the heart's blood showed no growth. Microscopic examination. The material was fixed in Zenker's fluid and stained with hematoxylin and eosin.

Sections of the corpus luteum in the left ovary revealed extensive necrosis. The necrosis was irregular in distribution but involved at least half or more

TABLE I—CHIEF COMPLAINTS AND OBVIOUS SIGNS AT THE TIME OF ADMISSION

Symptoms and signs	Treated by radiation		Treated by operation	
	Cases	Percent	Cases	Percent
Profuse menstruation	95	28.0	63	25.0
Irregular bleeding	63	18.0	22	8.8
Pelvic pain on pressure	11	3.0	13	5.2
Lower abdominal pain	36	10.0	38	15.2
Cystitis or urinary symptoms	8	2.0	3	1.0
Dysmenorrhea	8	2.0	10	16.5
Prolapsed uterus	2	0.6		
Backache	5	1.5		
Vaginal discharge	7	2.0		
Frequent miscarriages	1	0.3		
Pseudocyesis	1	0.3		
Weakness and fatigue	12	3.4	12	4.8
Presence of tumor noted	20	6.0	57	22.0
Symptoms unrelated	97	28.0	50	23.6
Tumor found in routine examination without symptoms	5	(29.5)	3	(24.6)
		1.5		1.0

each major group the average lapse of time since the menopause was 3.8 years. One patient aged 76 who had passed through the normal menopause at 52 had first noted the pelvic tumor 4 years before her treatment at the Mayo Clinic and during these 4 years the growth had been quite rapid. Instances of this type discredit the hypothesis that the growth of fibromyomata is stimulated by an ovarian hormone or interaction of ovarian and uterine tissues. Bland Sutton says that fibromyomata arise in the uterus only during menstrual life that after the cessation of menstruation they cease to grow and some diminish in size. Although the growths may have been present during menstrual life the following 2 cases cited by Trostler indicate that the excitation to growth may occur long after the ovaries have ceased to function.

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Fig 3 Low power photomicrograph of Case 2 showing extensive coagulative necrosis of the corpus luteum and liquefaction of the more peripheral cells. Note also the pale degenerating cells on the right and to the right of the large vessel. The infiltrating leucocytes are well shown.



Fig 4 High power photomicrograph of another field of the corpus luteum of Case 2 showing a few infiltrating polymorphonuclear and mononuclear cells among the necrotic cells and an area of liquefaction at the edge of the field.

visual disturbances and vertigo. Edema was not noticed. The patient again tried to effect abortion by the introduction of a slippery elm stick into the uterus. This she did 2 weeks before admission to the hospital and a foul vaginal discharge promptly developed. The vomiting in the meantime became most severe and the patient lost about 20 pounds in weight. She had been exceedingly weak and confined in bed for 2 weeks or more before admission.

Physical examination showed a well developed middle aged white woman. Prostration and desiccation were marked. There was extensive oral sepsis the mouth being dry and the tongue deeply furrowed. The thyroid gland was found moderately enlarged. The heart and lungs revealed no special abnormalities. The blood pressure was 126-14. The breasts were negative. The lower abdomen was slightly painful on palpation but otherwise negative. The genitalia showed evidences of previous lacerations and there was a thin vaginal discharge. The cervix was soft and admitted the index finger. The uterus was moderately enlarged soft and movable the size of a 2 months pregnancy. The adnexa were painful and thought to be enlarged. The extremities and reflexes were negative.

Course in hospital. The patient had been unable to retain food or drink and the vomiting was most marked. Under sedative treatment however by September 9 the vomiting was less severe but her general condition was considered poor. Large amounts of glucose solution were given under the breasts. The blood contained 67.4 milligrams of non protein nitrogen 1.4 milligrams of creatinine

and 140 milligrams of sugar per 100 cubic centimeters white blood cells 18,150 red blood cells 5,763,000.

On September 10 the patient was able to retain a little food. The blood pressure was 118/82. The urine showed a trace of albumin and sugar and acetone were slightly positive. Bile was present and a few hyaline casts were found. The blood Wassermann was negative.

By September 11 the vomiting had practically ceased and the patient was able to retain a little food. The latter was given by stomach tube. Glucose solution was again given intravenously. The patient did not improve but gradually became lethargic. The blood pressure was 110-90.

Up to September 12 the temperature had been within normal limits but this day it rapidly rose to 102.4 degrees F. The patient became toxic delirious and slight jaundice was noticed for the first time. The pulse was exceedingly rapid 156 per minute (ascutatory). A terminal diarrhoea developed and the patient died the next day.

The temperature was irregularly elevated after the initial rise of 102.4 degrees F and reached 103-105 and 10, degrees F before death. The pulse rate had been rapid throughout ranging from 110 to 126 per minute. The last 3 days the pulse rate reached 140 to 160 per minute. With the onset of fever the respiration became markedly accelerated 40 to 60 per minute.

A clinical diagnosis was made of hyperemesis gravidarum accompanied by jaundice desiccation high non protein blood nitrogen evidence of an

TABLE VI—COMPUTATION OF THE POSTOPERATIVE RESULTS WITH THE AVERAGE PERIOD OF CONVALESCENCE

Operation	Cases	Effect on menstruation				Symptoms of menopause				Survival in years	Health improved	Health not improved	Total
		Cases	Left and right	Partial	Had periods in menopause	N	M	Moderate	Severe				
Subtotal abdominal hysterectomy without oophorectomy	36	5	6			0	0	4	0	1	47	5	4
Hysterectomy with excision of ovary	64	54				12	7	7	8	3	5	4	4
Hysterectomy with excision of both ovaries	34	8			3	3	3	3	0	7	5	6	5

The inability to distinguish definitely from the history or physical findings between a degenerating fibromyoma and a fibromyoma with superimposed malignant disease or associated adnexal malignant disease constitutes the chief objection to the use of radiation for such tumors. It is undoubtedly a wise precaution for every patient treated by radiation to have a preliminary curettage. This seems imperative with a history of metrorrhagia or increased vaginal discharge. Even curettage unless done with extreme care may miss a small malignant lesion. Any question of adnexal attachment or uncertainty about disease in the adnexa should indicate an operation if the general health of the patient permits.

Masson refers to the difficulty in distinguishing simple degenerating or septic fibromyomata and polyps from true sarcomata not only in gross specimens but even after microscopic study. He points out that although sarcomata are occasionally found in the uterine wall and in the cervix they are more common in pre-existing fibromyomata. In 4322 patients operated on at the Mayo Clinic from 1910 to 1921 for fibromyomata he found sarcomatous change in 44 (1 per cent). Bland Sutton believes such tumors to be malignant from their onset. Ewing deplors the tendency of gynecologists to search through all areas of benign tumors and to regard any variations in structure as sarcomatous change. He has found the ordinary tumors to vary in structure in different persons and probably at different age periods. Such changes may not be progressive. He himself, has found only 3 malignant uterine fibromyomata with general metastasis and 2

with local recurrences in an experience extending over 20 years. Winter did not discover malignant disease among 753 patients and concludes that malignant degeneration of fibromyomata must be extremely rare. Williams reports a case in which 4 polyps were removed from the uterus in a period of 5 years. The first was considered benign, the second and third were diagnosed small round cell sarcoma and the fourth seemed to be a benign tumor. After a period of 3 years there was no sign of recurrence. Bédère states that sarcomatous disease of uterine fibromyomata before and after the menopause is observed in less than 2 per cent of the cases and from a clinical standpoint it is suggested by rapid growth, unusual softness on palpation and general symptoms of cachexia. Frequent observation of the cervix during a course of treatment is advised by Bédère to detect protruding polyps which are generally considered suggestive of malignancy. In 1918 Wagner reported a case in which he believes sarcoma developed as a result of roentgenological treatment for fibromyoma. The consensus of opinion at the present time is that such a tumor was sarcomatous from the beginning and roentgenological treatment simply caused necrosis of the growth and acute symptoms. Seitz and Wintz indeed recommend the use of radium and roentgen rays in all cases of doubtful sarcomatous change since the operative results are known to be poor while a sarcomatous growth is often checked by adequate radiation. Bland Sutton found the average duration of life following operation for myosarcoma of the uterus to be less than 2 years and the operation itself is attended with unusual risk. Radiation as the treatment

The left ovary had a fair number of interstitial cells in the walls of the atretic follicles. Inflammatory changes were absent.

The uterine muscle presented a uniform and well marked hypertrophy characteristic of pregnancy. The musculature under the placenta was very vascular. The decidua especially in the superficial portions had various large patches of exudate composed of neutrophilic polymorphonuclear leucocytes with scattered fibrin deposits in addition. Where the exudate was abundant small patches of decidua were necrotic. One large sinus was found acutely thrombosed. The deeper layers of the decidua and glands were free from inflammatory changes. A few of the basal glands contained a thick fluid. The tissue was also more or less oedematous. Otherwise the decidua was negative.

The placenta was not pathological and both layers of epithelium covering the chorionic villi were easily differentiated.

The cervix of the uterus showed extensive inflammatory changes characterized by a marked infiltration of plasma cells especially in the mucosa. The cervical epithelium was hyperplastic and thrown into low papillary like growths. Between the epithelial cells and also lying in the glands were numerous neutrophilic polymorphonuclear leucocytes. Several tiny cysts or occluded glands were scattered about. An ulcerated patch covered by a leucocytic and fibrinous exudate was found at the external orifice. A moderate lymphocytic infiltration was found in the subepithelial tissues of the vaginal portion of the cervix. The musculature of the cervix was also hypertrophied.

The liver cells about the central veins were atrophic. A fair amount of coagulum was lying between the vessel walls and the liver cells throughout the greater portion of the lobules but it was especially well marked centrally. Many of the central cells had pyknotic nuclei and some were fragmented. Here and there an occasional necrotic cell or cells were observed surrounded by a few neutrophilic polymorphonuclear leucocytes. The majority of the central cells contained many small fat vacuoles. Other cells found in the central areas were reduced to little more than shadows the cytoplasm apparently having been largely replaced by fat. The nuclei of these cells were pale. The central and the more peripheral cells as well contained a fair amount of finely granular yellowish pigment. The more peripheral and mid zone cells showed very little change aside from a few tiny fat vacuoles. No passive congestion was observed. The bile ducts presented no evidence of obstruction and the sections were otherwise negative.

The cytoplasm of the epithelial cells of the cortex of the kidney was granular and the cells were swollen and irregular. Certain nuclei were pyknotic but no necrotic cells were observed. The tubules of the superficial cortex were dilated and contained a honeycombed coagulum a portion of which at least came from the cytoplasm of the lining cells. Elsewhere the

changes were more or less typical of cloudy swelling or parenchymatous degeneration. The collecting tubules of the medulla contained a few hyaline casts. The glomeruli were swollen and congested and contained a honeycombed coagulum. The blood vessels were generally engorged but there were no hemorrhages. No evidence was found of acute nephritis or fatty changes. Otherwise the sections were negative.

The large adenomata of the thyroid gland presented essentially the same picture. They were made up of small closely packed and well preserved alveoli especially about the periphery while the centers were largely loose fibrous tissue degenerating alveoli and thick fluid. There was no evidence of hyperplasia of the alveolar epithelium the cells of which were small and fairly uniform in size. Colloid was slight in amount. The capsules were composed of dense fibrous tissue. The smaller adenomata had poorly defined capsules larger alveoli and the colloid here was not especially abundant.

The thyroid tissue proper was made up of large and irregular alveoli with flattened lining epithelium containing much colloid. Here the picture was suggestive of a colloid goiter. In certain of the larger alveoli were tiny intracystic papillomatous growths with a few scattered patches of small round cells. A few such cells were found in the adenomata.

The sections of the lungs showed a widespread oedema and a very fresh terminal bronchopneumonia. No tuberculosis or other chronic disease was found.

Sections from the small body on the jejunum revealed lobules of accessory pancreatic tissue apparently functioning. The pancreatic ducts and islet tissue were well defined. Otherwise the intestine was negative.

At one point there was a slight ulceration of the mucosa covered by a superficial leucocytic exudate. The lumen contained a fair number of neutrophilic polymorphonuclear leucocytes. No mononuclear exudate was observed. Otherwise the appendix was negative.

Bone marrow sections showed a diffuse and moderate degree of hyperplasia of the white and red blood cell elements.

The pathological diagnoses were pregnancy, necrosis of the corpus luteum, adenomata of the thyroid, jaundice, oedema of the lungs with a very early acute bronchopneumonia, fatty changes and oedema of the liver with a few necrotic central cells, parenchymatous degeneration of the kidneys, acute decidua endometritis, acute ulcerative and chronic cervicitis with old lacerations, acute ulcerative appendicitis and accessory pancreas.

In the first case the subject was a primipara who presented the clinical features of pernicious vomiting in the third month of pregnancy. The illness was acute and progressive, terminating in death 44 days after the onset. The hyperglycemia and glycosuria were

TABLE VIII—OPERATIONS SUBSEQUENT TO RADIUM TREATMENT (GROUP 1 TABLE VII)

Operation	Time since ad- minis- tration	Cause	Pathological condition	Remarks
Dilatation and curettage	1	Recurrent uterine inflammation	Fibromyoma	
First pelvic cytology		Painful	Negative fibromyoma	
Second pelvic cytology				Pelvic pregnancy
Myomectomy	15	Continuous bleeding	Chronic pelvic peritonitis. Tuberculous abscess of right ovary	Death from ether pneumonia
Subtotal abdominal hysterectomy	5 months	Chronic dysmenorrhea	Multiple fibromyomata	
Subtotal abdominal hysterectomy	5 months	Irregular bleeding	Mixed fibromyoma and leiomyoma	
Abdominal hysterectomy	8 months	Profuse flow	Extensive leiomyoma	No symptoms first 5 years the irregular bleeding. Y. S. Rad. m. d. Vag. no effective
Abdominal hysterectomy	5	Irregular bleeding	Mixed fibromyoma	Recurrence this year
Abdominal hysterectomy	5	Growth in the decidua	Malignant	Pelvic bleeding repeated radiation. Normal in size
Removal of growth with curettage	5	Painful		Pelvic bleeding had normal pregnancy after 1 year
Type unknown	45	Recurrent profuse flow		
Type unknown	7	Chronic dysmenorrhea		

technique used during the period covered (1918 to July, 1924) has been greatly modified. One is accustomed to see in the literature general statements with regard to the result of radiotherapy or an arbitrary expression of preference for either radium or roentgen rays without sufficient data to enable the reader to test the conclusions. Of the 344 patients treated by radiation recent replies have been received from 214 and reports from 91 later than 1 year after treatment making a total of reports on 305 cases. Unfortunately not all of the information requested was furnished by each patient; the percentages in the tables indicate only the positively ascertained results and will not always total 100.

The selection of either radium or roentgen rays as the therapeutic agent and the amount of each to be given depend largely on the situation and size of the fibromyoma. A small submucous fibromyoma responds usually to a small dose of radium; a larger tumor or a pedunculated tumor should receive a combination of radium and roentgen rays or roentgen rays alone. For young women who suffer chiefly from excessive menstruation with small

fibromyomata an effort is often made to treat with relatively small doses to maintain, if possible, a normal menstruation and the function of reproduction. The uncertainty of results in such instances is always carefully explained to the patient before the treatment is given (Table VII).

In Group 1 of the 53 patients reporting 18 (34 per cent) required repeated radiation. Six patients complained of an irritative vaginal discharge following the treatment. Twelve patients were subsequently operated on (Table VIII).

Besides the cases mentioned in Table VIII 1 patient developed a pelvic malignant disease symptoms occurring 3 years after the radium treatment. One patient also had a normal full term pregnancy following which menstruation again became profuse and the initial dose of radium (350 milligram hours) was repeated. The patient died 1 week later apparently from acute nephritis. This was the only death among the patients treated by radiation for nonmalignant pelvic diseases.

In Group 2 that is those receiving 500 to 999 milligram hours of radium further radi-

frequently found necrosis of the renal tubular epithelium was absent in each case. The lesions of the kidneys of neither were characteristic and were not unlike the degenerative changes occurring in any acute infectious or toxic disease.

The question at once arises as to the significance of the necrosis in the corpora lutea. From the appearance of each corpus luteum it seems probable that many of the necrotic cells had been there some time sufficient time at least for these cells to have undergone a certain amount of fragmentation and liquefaction. Especially was this true of the second case. On the other hand leucocytic infiltration in this case was only slight. In the first case leucocytic infiltration among the necrotic cells had advanced to a moderate degree yet the majority of the cells maintained their form fairly well. The necrosis in both instances was primarily a coagulative necrosis. In neither case was there any evidence of repair. The form of each corpus luteum had been well preserved by the fibrous tissue framework. On the whole in view of the gross and microscopic findings it appears that the bulk of the necrosis was not of long duration and hence occurred late in the disease.

The necrosis in these cases probably resulted from the underlying toxæmias of which the patients suffered. It therefore apparently belongs in the same category with the central necrosis of the liver cells and also with that of the epithelium of the convoluted tubules of the kidneys either or both of which may be found in this malady. Aside from the short life of the corpus luteum there are no reasons

why one should not expect necrosis of the lutein cells as well as that of any other parenchymatous structure. But why the necrosis should be so extensive in the corpus luteum and very slight or absent in the liver and kidneys where it is usually found is a question we cannot answer.

Realizing that the etiology of the toxæmias of pregnancy and particularly that of pernicious vomiting is obscure, we do not propose to offer the necrosis and the obvious deficiency of the corpus luteum as the underlying cause of this disease. Certainly two cases cannot prove this point. It may be that this lesion of the corpus luteum is well known to some and perhaps has occurred in conditions other than hyperemesis gravidarum.

Obviously in these two cases there must have been a marked deficiency of the corpus luteum secretions. But how long this deficiency persisted and the character of the disturbances it no doubt caused are things we do not know.

It is to be hoped that in the future, pathologists will routinely study the corpus luteum of pregnancy, whether or not it appears grossly pathological.

CONCLUSIONS

- 1 Necrosis of the corpus luteum may occur in pernicious vomiting of pregnancy.

- 2 Necrosis of the corpus luteum in pernicious vomiting of pregnancy probably has the same significance as has necrosis of the liver and kidneys in this disease.

We wish to thank Drs James L. Gilmore and Harold A. Miller for the privilege of using the clinical records.

TABLE VIII—OPERATIONS SUBSEQUENT TO RADIUM TREATMENT (GROUP 1 TABLE VII)

Operation	Time after treatment, years	Cause	Pathologic condition	Remarks
Dilatation and curettage	20	Peculiar attack of erysipelas	Fertility	
Excision of cyst, left ovary; second pelvic right pyosalpinx		Irregular	Presence of fibromyomata; second operation	
Myomectomy	1	Retention of lochia		Painful peritonitis
Subtotal hysterectomy	15	Continued bleeding	Secondary pelvic peritonitis. Tuberculous focus in right ovary	
Subtotal hysterectomy	5 or 6 months	Continued bleeding; dysmenorrhea		Death from the peritonitis
Subtotal hysterectomy	5 months	Light bleeding	Multiparous fibromyomata	
Abdominal hysterectomy	8 months	Profuse flow	Multiparous fibromyomata; great sacrospinous ligament	
Abdominal hysterectomy	5	Irregular bleeding	Excision of colloid carcinoma of endometrium; fibromyomata	No symptoms for first radiation; improvement for 5 years; the uterus enlarged 1 year; radiation had no effect
Abdominal hysterectomy	0.5	Growth in abdomen	Malignant	Recurrence of growth in year
Removal of growth of abdomen	5	Pain?		Painful abdominal distention; malodorous
Type unknown	45	Retention of lochia		Painful abdominal distention; normal pregnancy after treatment
Type unknown	7	Continued bleeding		

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The work of Allen and Doisy (1923) with the follicular hormone raised the question in our minds as to the production of the same hormone by the corpus luteum. We were especially anxious to test corpora lutea from swine on ovariectomized white rats in exactly the same manner in which such favorable results were obtained by Allen and Doisy with liquor folliculi. Hog corpora lutea the principal source of the commercial extract were generally used although a few tests were made on sheep and cow corpora lutea.

EXPERIMENTS

Our first consideration was for the certainty of the tissue with which we were dealing. The necessity for careful collection of our material was impressed on us by the fact that one of our associates obtained a slightly positive result with an extract of corpus luteum made from ovaries which had been carelessly collected by a laboratory diener and allowed to stand for a time. We felt that we could not correctly say that our extract was from the corpus luteum unless we took care that there were no other tissues present and that there was no chance for postmortem diffusion of substances from other tissues into the corpora extracted. In order that we might rule out this possibility of contamination with other tissues we gathered corpora lutea from hogs which had been alive but a few minutes before we clipped and rinsed the tissue.

The corpora lutea gathered in this way were then grouped as to size consistency, color and condition of the accompanying uteri. In some preparations we were careful to determine whether the hogs were pregnant or not and if pregnant to note the size of the embryos present. The corpora lutea from pregnant animals were grouped into three groups: (1) Those having embryos up to 30 millimeters in length, (2) those having embryos up to 50 millimeters in length, and (3) those having embryos over 50 millimeters in length. We think by this careful collection that we have reduced to a minimum the danger of contamination of our material with substances from other parts of the ovary and that we are dealing with the corpus luteum alone.

TABLE 1.—INJECTIONS OF CORPUS LUTEUM EXTRACTS INTO OVARIECTOMIZED RATS¹

Pep No	K d f orpor l tea	Amount of tr id in e l y d Grams	N m ber f te t
19	Large red	10	6
45	Red solid various fractions tested		1
72	Large red		2
89	Large red	60	1
103	Mixed pregnant and non pregnant	25	1
104	Mixed pregnant and non pregnant	0	1
105	Mixed pregnant and non pregnant	13	1
106	Mixed pregnant and non pregnant	20	1
113	Solid pink	20	2
113a	Acetone fraction of 113		1
114	Solid pink	12	4
117	Non pregnant solid pink	10	3
119	Non pregnant yellow fibrous	4	1
121	Pregnant red embryo 5 to 30 mm	20	1
123	Pregnant red embryo 35 to 50 mm	11	1
124	Pregnant red embryo over 50 mm		
128	Pregnant red embryo 5 to 50 mm	10	3
129	Pregnant red embryo 50 to 125 mm	20	2
130	Non pregnant large pink solid	25	2
137	Non pregnant large pink solid	20	1
133a	Pregnant red embryo 50 to 125 mm (Purified by alkaline hydrolysis)	20	1
165	Mixed red	20	1
199	Mixed red purified by alkaline hydrolysis	35	1

¹These rats were given ovary extract.

The extracts were made by the procedure described by Doisy, Ralls, Allen and Johnston (1924) which consists essentially in the precipitation and extraction of the proteins with alcohol and subsequent purification with acetone and ether. As negative results are of doubtful value unless the experiments are adequately controlled preparations from liquor folliculi and corpora lutea were made simultaneously by exactly the same technique. Preparations No. 133a and No. 199 were made by mild alkaline hydrolysis, and the non-saponifiable fraction was carefully purified. Its injection likewise produced negative results. This was done because the activity of the liquor folliculi preparations seemed to increase with the purification of the extract. Ovariectomized white rats and immature rabbits were used as test animals. For the estimation of activity in the rabbit we used a

TABLE V.—RESULTS OF ROENTGEN RAY TREATMENT

Type of tumor	Case	Course of treatment					Effect of treatment					Symptoms of menopause					Type of operation	Comments
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
Epithelioma	13	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	Usual to 10 years later
180 to 200 kV	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	2	divided

factorily at the time of operation. Two patients reported increased pelvic pain following the treatment. One patient in whose case the diagnosis of benign uterine tumor was somewhat questionable from the first but who because of obesity was considered a Grade 4 risk for operation developed a very definite carcinoma of the fundus 5 years after her first treatment and 2 years after the last application of radium. There had been a foul irritating vaginal discharge only partially controlled by radiation. Undoubtedly the uterus should have been curetted or extensively radiated at the first in view of the possible presence of malignant disease.

Of the patients receiving over 2,000 milligram hours of radium one had had previous roentgenological treatment for fibromyoma. On admission there was a marked degree of radiodermatitis over the anterior abdominal wall with an area of ulceration which when excised proved to contain epithelioma. Radium was applied for the reduction of the tumor. Three years later the patient returned with extensive pelvic carcinoma.

It is difficult to indicate satisfactorily the dosage of roentgen rays because of the multiple factors which may alter the resulting dose. In general the earlier patients (1918) were treated through several small fields (2.5 centimeters in diameter) over the symphysis pubis. Later the fields were enlarged, two being placed anteriorly to cover the lower abdomen and pelvis with one or two corresponding fields posteriorly. A typical setting may be indicated by the factors: 135 kilovolt peak tension, 5 milliamperes current, 6 millimeter aluminum filter, 40 centimeter skin focal distance, 40 minutes exposure to each

area. Occasionally an 0.5 millimeter copper filter was used with a corresponding increase in time of exposure. Since June 1923 a number of patients have been treated with rays produced at a tension of from 180 to 200 kilovolts. A more severe systemic reaction to the more penetrating rays was anticipated but has not been encountered. In fact the period of convalescence mentioned by the patients in this group has been actually shorter (Table V). There have been several instances of a more or less troublesome diarrhea continuing in the most severe cases for 3 weeks. Three of the earlier patients developed an annoying first degree radiodermatitis; exposure has been reduced sufficiently to avoid this in later cases. With this voltage the tumor is undoubtedly more promptly reduced. The patients treated with roentgen rays of moderate voltage have been selected from those for whom repeated observations and treatment would not be inconvenient.

In Group 1, 2 patient whose uterine tumor had been satisfactorily reduced reports an operation 2 years later for a small growth near the bladder. Its nature was not reported.

Among those treated with roentgen rays of higher voltage, 1 patient who suffered particularly from pressure of masses on the bladder was unrelieved and operation 1 year later showed a calcareous fibromyomatous mass impacted in dense adhesions. This patient should clearly have been refused radiation. The tumor had been present 12 years and was described as feeling unusually dense. In a second case, with a lobulated fibromyomatous mass extending to the umbilicus the central mass was unsatisfactorily reduced while the lateral portions were enlarged. In this case operation has

amount of liquor folliculi necessary to cause oestrus changes was much less than the amounts of corpus luteum injected. The animals upon which we tested our corpus luteum extracts were occasionally caused to have an induced oestrus cycle by the use of liquor folliculi to prevent the atrophy due to castration.

In our experiments upon rabbits the corpus luteum extracts gave in no case a positive result. Five tests of our corpora lutea extracts were tried on rabbits. The rabbits were injected with extracts of from 50 to 80 grams of tissue over periods of 4 to 7 days. Very typical results may be seen in the set of litter mates marked A. In this experiment the corpora lutea were clipped, the liquor folliculi was aspirated from the follicles and extracts were made of corpora lutea liquor folliculi and the remaining 'shucked' ovaries. Equal amounts of extracted tissue (77 grams) were injected over a period of 7 days. The results in each case may be seen in Figure 1. The uterus marked 857 is from the rabbit which had the corpus luteum injection and it can easily be seen that it is smaller than the control 856. Number 858 received extract of liquor folliculi and number 859 received the extract of the 'shucked' ovaries. Number 854 received injections of a water soluble commercial extract and no increase in size is noted.

We were anxious to see if the corpus luteum extract had any inhibitory effect on the action of the extract of liquor folliculi. Three litter mates C were used. Into each rabbit the extract of 75 grams of corpora lutea was injected into another the extract of 75 grams of liquor folliculi and into the third animal 150 grams of a mixture of equal parts of corpora lutea and liquor folliculi. If our corpus luteum extract had any marked inhibiting influence on the liquor folliculi extract we should expect the uterus of the animal which had the two extracts to be smaller than the uterus of the rabbit which had only the liquor folliculi extract but such was not the case the uterus of the animal with the two extracts being larger by a very small amount. We can not expect one experiment to prove this point but the result seemed to be of interest.

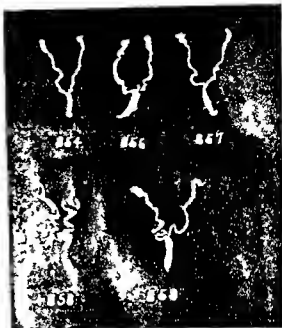


Fig. 1. Showing results of experiment in litter mates A.

SUMMARY

1. Corpus luteum has been cited as the source of the hormone which produces hyperplasia of the genital tract and some authors claim that extracts made by extracting corpus luteum with lipid solvents are able to cause growth in the genital tract of certain mammals.
2. The amount of care exercised in collecting material is a factor which must be considered in order to be sure of the type of tissue obtained.
3. Using rats and rabbits we were unable to produce any noticeable changes in the genital tract by the injection of the alcohol ether acetone extract of carefully collected corpora lutea from pigs.
4. Pregnancy of the animals from which the corpora lutea were gathered the size consistency or color of the corpora lutea had no effect on the results obtained.
5. We have obtained repeated positive tests with the alcohol ether acetone extract of liquor folliculi of bog ovaries and in view of this are inclined to believe that the corpus luteum does not secrete the hormone which produces hyperplasia of the uterus and vagina.

nience in the dosage required. A study of individual cases shows so many thoroughly satisfactory results with radiotherapy that the discrepancy in the total results must apparently be attributed to injudicious selection of cases, or to inadequate dosage. Great care must be exercised to rule out malignant disease at the time of radiation. Curettage should precede treatment in any case with suspicious symptoms. Inflammation while apparently uninfluenced by radiation *per se*, as is shown by the lack of reaction to roentgen rays is undoubtedly occasionally aggravated by the manipulation incident to the application of radium. Unusually hard fibromyomata containing extensive calcium deposits cannot be reduced satisfactorily by radiation; an incarcerated pelvic tumor is undoubtedly best removed surgically because of the inability to exclude adnexal disease. A roentgenogram may occasionally aid in detecting calcium deposits within a tumor.

The need of extreme care in excluding malignant disease is indicated by the fact that in 6 of the patients treated by radiotherapy a well established malignant process appeared within 1 year of the treatment. One other patient has probably malignant disease of the ovary but refuses operation. Two others developed malignant disease within the 2 years after treatment although in 1 case this may be considered a recurrence of the epithelioma in the abdominal wall at the time of radiation. In 4 patients who remained free from symptoms for 3 years following treatment malignant disease appeared. This may not be a higher percentage than that of pelvic malignant disease for all women at their age (1.1 per cent). However it raises the question whether a focus of relatively devitalized tissue with altered blood supply may favor malignant change. I believe that complete subsequent histories should be kept for all patients treated with radium or roentgen rays so that we may have more data relative

to this subject. One death (0.9 per cent) followed the application of a small amount of radium and there were two surgical deaths (0.8 per cent) one of which must be attributed rather to the primary operation than the removal of a ruptured appendix.

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RETROPOSITION OF THE UTERUS, A PRESENT DAY ESTIMATE

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THERE is perhaps no subject in the whole field of gynecology concerning which more divergence of opinion has been expressed than that of uterine malposition. The significance, prevention and treatment of posterior displacement of the uterus are not adequately understood or properly evaluated by the rank and file of the medical profession. The theme of this paper was suggested by a consideration and studied interpretation of an authoritative editorial from the able pen of Arthur Dean Bevan (2) in the February, 1925, issue of *SURGERY GYNECOLOGY AND OBSTETRICS*. With reservations we accept the conclusion that the uncomplicated movable retroposed uterus produces no symptoms and that 'the time has arrived when operations done on women for retroposition of the uterus and for this condition alone are unwarranted unnecessary and in defensible.

SIGNIFICANCE OF RETROPOSITION OF THE UTERUS

Ample statistics have been collected by Stacy (12), Jaschke (8) and others in support of the dictum that retroposition of the uterus *per se* does not produce symptoms and therefore does not require treatment. A concise analysis of this broad subject however demands recognition of the teaching advanced by Thielhauber (14) in 1895 and confirmed by Baldy (1), Bovee (3), Clark (4), Findley (5) and many others that the so called symptoms of retroposition are not characteristic of the displacement but are indeed quite characteristic of the various complications that are so frequently incidental. Symptoms may vary in direct proportion to the kind and extent of the associated lesions. In general it is possible on careful examination to ascertain the particular pathology causative of gynecological symptoms in each case. Admittedly in an occasional instance symptoms may be due to the mechanical dystocia but there can be no doubt that such is the exception to the general

rule. That the primary displacement can be the cause of pathological sequelæ is the consensus of expert gynecological opinion borne out by definite clinical observation.

A study of 1000 consecutive cases of retroposition of the uterus examined in the Clinic of Cornell University Medical College revealed the facts shown in Table I.

TABLE I—RETROPOSITION OF THE UTERUS

Pathology	S	d	w	m	M	d	w	m
	N				N			
Complicating pathology demonstrable on examination	53	43	816	90				
Cervical disease	38	35	721	80				
Vaginal disease	10	10	496	54				
Adherent retroversion	11	11	261	29				
Plastic dystocia, cystocele, prolapsus, etc.	2	2	414	45				
Symptomatology								
Leucorrhœa	48	48	668	74				
Dysmenorrhœa	67	67	386	42				
Backache	32	32	375	41				
Menorrhagia	7	7	81	9				
Stenility								

Of the 900 married women 214 or 23.7 per cent had never been pregnant.

In 73 or 8 per cent stenility was the chief complaint 686 or 6 per cent had been pregnant.

Before drawing conclusions from these statistics or any similar tabulation we must appreciate that the variety of pathological and symptomatic combinations is infinite. It is apparent that each case must be studied and treated on its merits and there is no rigid rule that can govern the character and proper management of retrodisplacement of the uterus. The outstanding inference is that symptom producing retroposition is most prevalent among women who have been pregnant and that the causative pathology is demonstrable in the great majority of cases. We must assume that retrodisplacement of the uterus is always an anatomical abnormality and it is not logical to insist that such an anomaly is normal for any woman though frequently there may be no symptoms attributable to such displacement.

this paper. He claims to have obtained satisfactory results in eclampsia by feeding calcium salts. He gave absolutely no laboratory data in support of his views and his suggestion was promptly forgotten.

In 1911 Drennan (4) wrote the following: "Puerperal eclampsia may be caused by a toxæmia the result of a fatty infiltration first and following that, a fatty degeneration of the liver cells due to the abstraction by the fetus of the calcium which should normally unite with the neutral fat in these cells to form lipoids whereby it could be removed to its—neutral fat—natural depots in the body."

LITERATURE ON CALCIUM

In reviewing the literature on blood calcium one should have in mind the following important facts. The figures given by different authors have not the same significance because some express the findings in terms of milligrams of calcium per 100 cubic centimeters of whole blood others in terms of plasma and others in terms of serum. Furthermore the methods of quantitative determinations are not always the same and in many cases are now considered unreliable. In this paper unless otherwise noted the figures refer to milligrams of calcium per 100 cubic centimeters of blood serum.

Normal calcium figures for the adult as determined by Howland and Marriott (6) in 1916 are 9 to 11 milligrams per 100 cubic centimeters of serum. Halverson, Mohler and Bergen (5) gave the average for normal men as 10.2 milligrams. Lyman (17) in a series of cases reports an average of 6.1 milligrams per 100 cubic centimeters of whole blood for normal men and 7.1 milligrams for normal women. Working with older methods Jansen (7) reports somewhat higher findings: 11.5 to 12.0 milligrams per 100 cubic centimeters of serum.

Calcium figures for normal pregnancies vary somewhat with different authors. Jansen (7) gives 11.5 to 12.0 milligrams for pregnancy and puerperium, which is the same as for his normal controls. Krebs (13) reports normal figures for early pregnancy and slightly lowered figures for the latter half of pregnancy. Widdows (24) gives similar findings

to those of Krebs. Many other observers such as de Wesselow (2), Mazzocco (18) and Aymenich (1) report no appreciable change in the blood calcium during pregnancy. Linzenmeier (14) claims that he has found the calcium increased in the latter half of pregnancy.

The literature on the blood calcium in eclampsia is extremely meager. There are many reports (8-11) on calcium content of the blood in various pathological conditions in which eclampsia is not mentioned. In 1913 Linzenmeier (14) writes that in 5 cases of eclampsia he found no decrease in calcium. Morley (22) in the same year by an indirect method of precipitating with oxalic acid and counting the crystals found a decrease of calcium in pregnancy. He concludes: "From these considerations it is too much to hope or to prophesy that some day the unsettled etiology of the toxæmias of pregnancy may be explained by some disordered calcium economy on the part of the patient."

Again Kehr (10) elaborating on his earlier work reports findings of calcium deficiency in eclampsia. His figures are based on whole blood determinations. His normal pregnancies give the following figures: maximum 7.26, minimum 5.79 and average 6.46 milligrams. In a series of 24 cases of antepartum eclampsia his figures are: maximum 8.04, minimum 4.1, and average 5.48. In several cases of postpartum eclampsia his figures are: maximum 8.41, minimum 5.32 and average 6.95. An analysis of these results shows that Kehr is not justified in his conclusions. In the first place his reports are based on whole blood determinations—a procedure which has been repeatedly shown to be unreliable. In the second place although his average figure for antepartum eclampsia is lower than that for normal pregnancy the fact remains that his maximum figure is higher than that for normal pregnancy. Furthermore his postpartum eclampsia show an average of calcium considerably higher than his normal pregnancies. In view of the above it cannot be said that Kehr's results support his conclusions.

In 1917 Halverson, Mohler and Bergen (5) in a series of normal and pathological cases,

indications to the use of a pessary are easily recognized and the futility of pessary treatment quickly established. As an aid to promotion of complete involution by means of posture and exercises a proper fitting pessary is the most effective means we have for the prevention of posterior displacement of the uterus. The routine insertion of an Albert Smith pessary at an interval after abortion, miscarriage or labor in conjunction with proper post partum care and follow up observation will lessen the incidence of uterine malposition. A pessary should be worn for a period of from 1 to 6 months and local treatment of cervical laceration and disease with the electrocautery may be indicated.

The incidence of retroposition of the uterus following labor is placed by Lynch (10) at 41 per cent and by Paine (11) at 50 per cent. Probably if obstetrical cases were observed post partum over a much more extended period greater prevalence would be noted. It is not unusual to find a fundus uteri in good position at 2 months after delivery and to find it in extreme retroversion at 6 months post partum.

TREATMENT

It is rarely necessary to treat retroposition of the congenital type. Marriage and pregnancy activate the genital physiology most favorably in many cases and unless the disability is severe radical measures are only infrequently indicated. After competent diagnosis and observation however interference is often attended with excellent results. Rational conservatism demands according to Stoeckel (13) that apparently uncomplicated mobile retrodisplacement of the uterus when causative of symptomatic complaint be subjected to proper treatment. Recognizing the potential pathology and the predisposition to pelvic morbidity in uncomplicated posterior displacement we find definite indications for palliative measures and even as Grad (7) has maintained prophylactic operation. While sterility may be the only complaint when pregnancy and normal post partum involution occur an absolute and permanent cure may result. As a rule unless the uterus is maintained in good position after labor by a suitable pessary for an extended

period of time recurrence of the displacement takes place. Operative treatment is the proper procedure in very few cases of deficient structural development and even in this small group the likelihood of cure is slight indeed.

If the pessary treatment of the acquired type is instituted early enough cure can reasonably be expected. As a rule when more than one year has elapsed after termination of the causative pregnancy, conservative treatment will not effect a cure, and yet depending upon the age of the woman and the character of her disability it is often evidence of superior judgment to defer operative treatment if transient relief can be obtained by such palliative measures. Not infrequently one may observe pregnancy supervene and with the aid of continued pessary support for perhaps several months efficient obstetrical care post partum may be rewarded by permanent cure of the displacement. In this condition as in all others systemic hygiene and constitutional improvement will enhance all local treatment.

When, however the condition has progressed to the stage of definite anatomical impairment and structural atrophy no amount of postural or calsthenic treatment will suffice and operative treatment is imperative. Of the hundred or more operations devised for the cure of retroposition of the uterus it is perhaps fair to say that each and every one may in a properly selected case effect an anatomical or a symptomatic cure or both. While a standardized technique will never be recognized as applicable to all cases of retroposition of the uterus it is true that almost all of the known methods were thrown into the discard and that the few best ones be approved.

As Bevan (2) has well said no surgeon has a right to perform an operation for fixation of the uterus that carries with it the danger of intestinal strangulation. There can be no doubt but that the number of such disasters as he has reported is on the increase due to the greater frequency of popular and easy methods of uterine suspension. Every operation that bridges the abdominal cavity as in ventral fixation Olshausen or Gilliam methods should be abandoned. It must be admitted that gut strangulation is a likely possibility in every operation of such type.

women had ever suffered any previous pregnancy toxæmias

SUMMARY AND CONCLUSIONS

In a study of the blood calcium level in eclampsia it has been shown that

- 1 On theoretical grounds a decrease in the blood calcium may be expected in eclampsia
- 2 The literature on this subject does not definitely clear this point
- 3 In this research it has been demonstrated that there is no appreciable relation between the blood calcium and eclampsia

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A COMPARATIVE STUDY OF RADIATION AND SURGICAL TREATMENT FOR FIBROMYOMATA OF THE UTERUS¹By FRANCES A. FORD, M.D., ROCHESTER, MINNESOTA
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A COMPARATIVE study of representative groups of patients treated at the Mayo Clinic for fibromyomata of the uterus either by operation or by radiation has been undertaken to determine the late results of these methods of treatment and the incidence of complications. This has afforded at the same time an opportunity to review certain clinical phases of the presence of fibromyomata in relation to the symptoms and the general health of the patient. The 250 patients operated on represent those registering consecutively during 1918 for whom a diagnosis of fibromyomata of the uterus was made and who were referred for surgical treatment while the 344 patients treated by radiation include a group from each year (1918 to July 1941) because of the gradually changing dosage and technique of radiotherapy during that time.

Ewing asserts that 50 per cent of all women more than 30 and 20 per cent of those more than 25 have fibromyomata. The presence of demonstrable tumors is rare during puberty, although Leopold believes that the rudiments of them may be found in the uteri of children. The average age of the 250 patients at the time they presented themselves at the Clinic for examination and treatment was 42.9 years. The average age of the 245 patients treated by radium was 44.4 years, of the 63 treated by radium and roentgen rays 46.3 years, and of those treated by roentgen rays alone 47.1 years. While the presence of tumors had often been detected many years before the menopause the symptoms apparently had not been troublesome until the patient approached that period.

The fact that the average age of the surgical patients is lower than that in the other groups might be construed as an attempt to apply to younger persons the treatment which is best adapted to conserving reproductive function. Surgical myomectomy is generally regarded

as the method of treatment most likely to attain this object, there are many instances in the literature in support of this belief. For example, Gellhorn cites a case in which, after four large interstitial fibromyomata had been excised, the patient went to a normal full term pregnancy. However, pregnancy with the birth of a normal child has also been observed following radiotherapy. Castano, in reporting 250 cases of fibromyomata treated by radiation, states that three of the patients became pregnant following treatment. Of 1,013 patients treated with radium at the Mayo Clinic since 1915, Stacy found that 4 women had each had a living child, 3 others had given birth to dead fetuses, 1 had had two miscarriages and 1 was pregnant at the time of her report. In a series of 741 myomectomies reviewed by Stacy, 33 women later had a viable child and 11 women 2 or more children. Schiller reports the history of a woman aged 43 who had never been pregnant. Premature menopause was induced by roentgen rays because of excessive bleeding. Definite fibromyomata were present in the uterus. Six months after the treatment, menstruation reappeared once after which the patient became pregnant and delivered a full term baby which was normal at the last observation 18 months later.

Of the cases reviewed in the present study, 3 in the surgical group were under 30 years, but in each case at operation myomectomy proved to be impracticable. Five of the patients treated by radiation were under 30. Three of the 5 had normal pregnancies following radium treatment, all of these being included among the cases reported by Stacy. Three were operated on because of a return of symptoms while the fifth has not been heard from. Twenty-seven per cent of the patients treated surgically and 22 per cent of those treated by radiation were between 30 and 40. Thirty-eight were past the menopause, 19 in



Fig 1



Fig 2



Fig 4

Fig 1 Actual size drawing of coronal section through semilunar cartilage and cyst of Case 1. Defect in upper margin of drawing represents the principal cyst cavity which was open and to permit inspection of the cyst. Smaller cysts can be seen below Remains of semilunar cartilage on extreme right.

Fig 2 Actual size drawing of coronal section through specimen removed in Case 2. Defect in extreme right represents the principal cyst cavity with numerous smaller cysts to the left. Remains of cartilage on the extreme left.

Fig 4 Actual size drawing of specimen from Case 3 showing the main cyst cavity.

On section the cyst was found to be filled with a mucoid substance tinged with red.

The patient made an uneventful convalescence and was discharged home on January 18 walking with the aid of crutches without pain.

February 18, 1925 she was discharged from care. At this time she had no pain, was walking without support and had a full range of motion in the knee.

CASE 2. N. W., a female 30 years of age came to the Orthopedic Outpatient Department of the Massachusetts General Hospital in February, 1925 complaining of pain in the left knee of 2 years duration. She ascribed her trouble to an injury which she received in a trolley car collision immediately before the onset. The pain was intermittent at first and gradually became worse. The condition had been diagnosed as rheumatism and had been treated without relief.

Examination disclosed a definite localized resilient tumor mass over the external aspect of the left knee in the joint line and directly above the head of the fibula. The mass about the size of an American walnut was located under the lateral ligament and attached on its deep surface to the structures beneath it. The mass was tender on pressure. Pain was present on complete extension and on flexion to 90 degrees. Patient walked with a slight limp.

A diagnosis of cyst of the external semilunar cartilage was made. The patient was admitted to the ward and operated upon on February 25. A vertical incision was made over the site of the tumor mass and when the fibers of the external lateral ligament were separated the tumor pushed up into the incision. It was found to be continuous with the external semilunar cartilage and was removed together with the entire cartilage (Fig 2).

Examination of the cyst showed it to be in the semilunar cartilage, multilocular in character and filled with a reddish mucoid substance (Fig 3).

On April 3, 1925 the patient was able to walk freely without aid and had a range of motion of 70 degrees from 5 to 75 degrees. No pain or tenderness was present.

CASE 3. P. V., a male 22 years of age came to the Orthopedic Outpatient Department of the Massachusetts General Hospital in February, 1925 complaining of pain in the right knee. He first noticed a lump on the inner aspect of the right knee on arising on the morning of November 9, 1924 about 3 months previously. He could recall no injury to which to ascribe the condition. The knee was painful at intervals especially at night. He had cramp-like pains in the calf of the leg and in the front of the thigh. A sharp pain in his knee came on when the leg was extended. The knee was most painful on complete extension and acute flexion. The most comfortable position was about 85 degrees of flexion of the knee.

Examination showed a definite resilient tumor mass the size of half an English walnut, visible and palpable on the inner aspect of the right knee in the joint line and extending downward onto the inner aspect of the tibia. It was covered by the internal lateral ligament and attached on its deep aspect to the structures upon which it rested. It was tender to pressure. The swelling according to the patient was no greater on admission than when first noticed 3 months before. The patient walked with a decided limp. The blood Wassermann was negative.

A diagnosis of cyst of the internal semilunar cartilage was made. The patient admitted to the ward and operated upon on February 25, 1925. Through a curved transverse incision over the mass the internal lateral ligament was exposed. When the fibers of the lateral ligament were separated the tumor mass pushed through the opening. The cyst seemed to arise from the semilunar cartilage and to have grown down onto the side of the tibia. In order to remove the cyst intact it was necessary to remove the internal semilunar cartilage. This cyst much larger than either of the cysts removed from the external semilunar cartilage was found to be filled with the same kind of reddish mucoid material (Fig 4).

The patient made an uneventful recovery and when discharged from treatment on June 3, 1925.

TABLE III—FECUNDITY OF PATIENTS WITH FIBROMYOMATOUS TUMORS

	Treated by radiation			Treated by operation		
	Cases	P	t	Cases	P	t
Marrow	302			224		
No pregnancies	56	18 0		66	30 0	
Miscarriages only	30	6 6		26	12 0	
Nonsterile	246			248		
Average miscarriages	0 75			0 8		
With viable child	226			122		
Average children each patient	3 1			2 6		

TABLE IV—SIZE OF TUMORS¹

Tumors	Total cases	Grade 1		Grade 2		Grade 3		Grade 4	
		Cases	Percent	Cases	Percent	Cases	Percent	Cases	Percent
X rays	30	6	20 0	14	46 0	10	33 0		
Radium	224	177	79 0	44	20 0	3	1 3		
X rays and radium	64	23	36 0	37	58 0	9	14 0		
Operation	240	61	25 0	86	35 8	70	30 0	14	5 8

1. If we take into account the distribution of tumors with regard to size, we find that

TABLE V—THE FREQUENCY AND TYPE OF PREVIOUS TREATMENT FOR OPERATIVE CASES

Previous treatment	Case	Treatment	
		By radiation	By operation
Miscarotomy	25	15	10
Unilateral oophorectomy	7	14	13
Partial bilateral oophorectomy	1		1
Cysts of ovary	10	4	6
Drainage of pelvic abscess	5	2	4
Dilatation and curettage	54	42	12
Polyps from cervix	5	4	1
Tumors from cervix (1 dermatoid others not specified)	9	2	7
Trachelorrhaphy	5	3	2
Internal suspension of uterus	10	17	2
Cauterization of cervix	1	1	
Hysterotomy	1	1	
Radium (2 had 2 applications)	3	3	
X ray	1	1	

that of a 4 months pregnancy are best cared for surgically. Recent reports by prominent radiotherapists indicate a tendency to disregard this limit. Becière in 1922 in a review of 300 new cases of fibromyomata treated by roentgen rays cautions against treatment of an incarcerated pelvic tumor but includes among cases successfully treated those with tumors extending 30 to 34 centimeters above the symphysis pubis.

In the present series the tumors have been divided into 4 grades according to extent. Grade 1 pelvic tumors. Grade 2 abdominal pelvic tumors up to one half the distance from the symphysis to the umbilicus. Grade 3 tumors extending half way to the level of the umbilicus. And Grade 4 all tumors above this level (Tables IV and V).

From the pathological report following operation note was made not only of the percentage of error in diagnosis but also of the incidence of any condition which might have caused complications had that patient been treated by radiation. Of the 250 patients operated on 71 presented multiple fibromyomata and 29 single fibromyomata without any pelvic complications determined by the surgeon or by the pathologist in the examination of the specimen. In 53 cases the tubes and ovaries were definitely described as normal. In 95 cases (38 per cent) however chronic pelvic inflammation was found although it had not been indicated by physical findings or history. In 10 cases tubo-ovarian abscesses were present. There is a general belief that the application of radium or the roentgen ray to inflammatory lesions is likely to cause an exacerbation. Presumably 40 per

cent of the cases treated by roentgen ray or radium would show chronic pelvic inflammation if explored while as indicated in Tables VII to X an active inflammatory reaction to radium or roentgen ray is relatively rare. Becière has never encountered such a reaction to roentgenologic treatment although it occasionally follows the application of radium.

The percentage of errors in diagnosis is likewise noteworthy on the assumption that one might encounter the same degree of error in a similar group of patients treated by radiation. Among the conditions which may be so listed in the surgical group were 11 cases of unsuspected adenomyomata, 4 of carcinoma of the ovary and 1 of sarcoma of the uterus. The question of degeneration of fibromyomata is particularly interesting in this regard. In this series there were 31 fibromyomata described by the pathologist as degenerating, 6 being calcareous, 5 very cellular, 4 necrotic, 2 dermatoid, 2 hemorrhagic, 2 cystic while 8 were described as degenerating.



Fig 1



Fig 2



Fig 4

FIG 1 Actual size drawing of coronal section through semilunar cartilage and cyst of Case 1. Defect in upper margin of drawing represents the principal cyst cavity which was opened to permit inspection of the cyst. Smaller cysts can be seen below. Remains of semilunar cartilage on extreme right.

FIG 2 Actual size drawing of coronal section through specimen removed in Case 2. Defect in extreme right represents the principal cyst cavity with numerous smaller cysts to the left. Remains of cartilage on the extreme left.

FIG 4 Actual size drawing of specimen from Case 3 showing the main cyst cavity.

On section the cyst was found to be filled with a mucoid substance tinged with red.

The patient made an uneventful convalescence and was discharged home on January 18 walking with the aid of crutches without pain.

February 18, 1925 she was discharged from care. At this time she had no pain, was walking without support and had a full range of motion in the knee.

CASE 2. N. W. a female 30 years of age came to the Orthopedic Outpatient Department of the Massachusetts General Hospital in February, 1925 complaining of pain in the left knee of 2 years duration. She ascribed her trouble to an injury which she received in a trolley car collision immediately before the onset. The pain was intermittent at first and gradually became worse. The condition had been diagnosed as rheumatism and had been treated without relief.

Examination disclosed a definite localized resilient tumor mass over the external aspect of the left knee in the joint line and directly above the head of the fibula. The mass about the size of an American walnut was located under the lateral ligament and attached on its deep surface to the structures beneath it. The mass was tender on pressure. Pain was present on complete extension and on flexion to 90 degrees. Patient walked with a slight limp.

A diagnosis of cyst of the external semilunar cartilage was made; the patient was admitted to the ward and operated upon on February 25. A vertical incision was made over the site of the tumor mass and when the fibers of the external lateral ligament were separated the tumor pushed up into the incision. It was found to be continuous with the external semilunar cartilage and was removed together with the entire cartilage (Fig 2).

Examination of the cyst showed it to be in the semilunar cartilage multilocular in character and filled with a reddish mucoid substance (Fig 3).

On April 3, 1925, the patient was able to walk freely without aid and had a range of motion of 0 degrees from 5 to 75 degrees. No pain or tenderness was present.

CASE 3. P. V. a male 22 years of age came to the Orthopedic Outpatient Department of the Massachusetts General Hospital in February, 1925 complaining of pain in the right knee. He first noticed a lump on the inner aspect of the right knee on arising on the morning of November 9, 1924, about 3 months previously. He could recall no injury to which to ascribe the condition. The knee was painful at intervals especially at night. He had cramp-like pains in the calf of the leg and in the front of the thigh. A sharp pain in his knee came on when the leg was rotated. The knee was most painful on complete extension and acute flexion. The most comfortable position was about 85 degrees of flexion of the knee.

Examination showed a definite resilient tumor mass the size of half an English walnut visible and palpable on the inner aspect of the right knee in the joint line and extending downward onto the inner aspect of the tibia. It was covered by the internal lateral ligament and attached on its deep aspect to the structures upon which it rested. It was tender to pressure. The swelling according to the patient was no greater on admission than when first noticed 3 months before. The patient walked with a decided limp. The blood Wassermann was negative.

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The patient made an uneventful recovery and when discharged from treatment on June 3, 1925,

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	T reated by radiati		T reated by ope ration	
	Cases	P e r c t	Cases	P e r c t
Married	302		214	
No pregnancies	56	18.0	66	30.0
Miscarriages only	20	6.6	26	12.0
Nonsterile	246		148	
Avera e miscarria es	0.75		0.8	
With viable child	226		122	
Average children each pa tient	3.1		2.6	

TABLE IV—SIZE OF TUMORS¹

T e m t	Total case	GRADE		G de		G d 3		G d 4	
		Cases	P e r c t	P e r c t	P e r c t	P e r c t	P e r c t	P e r c t	P e r c t
X rays	30	6	20.0	14	46.0	10	33.0		
Radium	124	177	70.0	14	20.0	3	1.3		
X rays and radium	64	23	36.0	32	50.0	9	14.0		
Operation	140	61	25.0	86	35.8	79	30.0	14	5.8

1. Few t s c t d t a w t h g d t u z o f t m w e n t

TABLE V—THE FREQUENCY AND TYPE OF PREVIOUS TREATMENT FOR OPERATIVE CASES

T reat m e n t	Case	T reat m e n t	
		By radiati	By operati
Myomectomy	25	15	10
Unilateral oophorectomy	27	14	13
Partial bilateral oophorectomy	1		1
Cysts of ovary	10	4	6
Drainage of pelvic abscess	5	1	4
Dilatation and curettage	54	42	12
Polyps from cervix	5	4	1
Tumors from cervix (1 dermoid others not specified)	9	2	7
Trachelorrhaphy	5	3	2
Internal suspension of uterus	10	17	2
Cauterization of cervix	1	1	
Hysterotomy	1	1	
Radium (2 had 2 applications)	3	3	
X ray	1	1	

that of a 4 months pregnancy are best cared for surgically. Recent reports by prominent radiotherapists indicate a tendency to disregard this limit. Beclere in 1922 in a review of 300 new cases of fibromyomata treated by roentgen rays cautions against treatment of an incarcerated pelvic tumor but includes among cases successfully treated those with tumors extending 30 to 34 centimeters above the symphysis pubis.

In the present series the tumors have been divided into 4 grades according to extent. Grade 1 pelvic tumors. Grade 2 abdominal pelvic tumors up to one half the distance from the symphysis to the umbilicus. Grade 3 tumors extending half way to the level of the umbilicus and Grade 4 all tumors above this level (Tables IV and V).

From the pathological report following operation note was made not only of the percentage of error in diagnosis but also of the incidence of any condition which might have caused complications had that patient been treated by radiation. Of the 250 patients operated on 71 presented multiple fibromyomata and 29 single fibromyomata without any pelvic complications determined by the surgeon or by the pathologist in the examination of the specimen. In 55 cases the tubes and ovaries were definitely described as normal. In 95 cases (38 per cent) however chronic pelvic inflammation was found although it had not been indicated by physical findings or history. In 10 cases tubo ovarian abscesses were present. There is a general belief that the application of radium or the roentgen ray to inflammatory lesions is likely to cause an exacerbation. Presumably 40 per

cent of the cases treated by roentgen ray or radium would show chronic pelvic inflammation if explored while as indicated in Tables VII to X an active inflammatory reaction to radium or roentgen ray is relatively rare. Beclere has never encountered such a reaction to roentgenologic treatment although it occasionally follows the application of radium.

The percentage of errors in diagnosis is likewise noteworthy on the assumption that one might encounter the same degree of error in a similar group of patients treated by radiation. Among the conditions which may be so listed in the surgical group were 11 cases of unsuspected adenomyomata, 4 of carcinoma of the ovary and 1 of sarcoma of the uterus. The question of degeneration of fibromyomata is particularly interesting in this regard. In this series there were 31 fibromyomata described by the pathologist as degenerating, 6 being calcareous, 5 very cellular, 4 necrotic, 2 edematous, 2 hemorrhagic, 2 cystic while 8 were described as degenerating.

pletely replaced by dense concentrically arranged fibrous tissue. I am quite certain that you can exclude a lymphatic or synovial origin for these cysts.

Taking the pathological report of Dr Wolbach as a basis it is reasonable to assume that the exciting cause of these cysts might be an injury but such an assumption cannot explain the evident progressive degeneration of the cartilage over a period of months or even years after the injury.

Fisher (3) believed that the outer third of the semilunar cartilages derived their nourishment from blood vessels that entered the cartilage on the periphery. The inner two thirds on the other hand derived its nourishment from the synovial fluid. His reason for this belief was based on his observation that in transverse tears of the semilunar cartilage the outer third healed by dense fibrous tissue while the inner two thirds failed to heal at all.

This power of repair on the part of the outer third of the semilunar cartilage might logically be explained by the better blood supply of that part of the cartilage or by the invasion of fibroblasts from the fibrous tissue present about the periphery of the cartilage. Moreover the failure of the inner two thirds of the cartilage to unite might be due to a feeble blood supply, lack of immobilization, the tendency of the torn ends to retract or to a combination of all three factors.

In all the cysts reported the main cyst representing the most advanced state of the degenerative process was in the periphery of the cartilage which would support the belief that a serious interference with the blood supply of this region was the exciting cause of the degeneration. The observation of Dr Wolbach in his report of the histological study of the three cases here reported that toward the inner margin of the cartilage there is a profound change in the texture of the fibrocartilage giving an appearance of irregular areas slightly stained or not stained at all

would lend support for the belief that the semilunar cartilage was nourished almost if not entirely by the blood vessels which enter the cartilage at the periphery and that the inner part of the cartilage being deprived of its source of nourishment by the original injury or by the degenerative process on the periphery also degenerated.

From the study of the cases here reported and a review of the cases previously reported it is our belief that these cysts represent the end result of a degenerative process caused by an interference with the blood supply of the cartilage in this region the exciting cause of which is a non lacerating injury.

The salient points about all the cases reported are

- 1 The cysts are multilocular
- 2 They have no endothelial lining (Exception Ollerenshaw's case)
- 3 They are filled with a mucoid substance
- 4 There is no evidence of inflammatory reaction about them
- 5 The cysts have in all cases been located in the midportion of the semilunar cartilage on the external border
- 6 A definite history of injury was present in almost half of the cases
- 7 The cysts reach their maximum size quickly and then remain stationary
- 8 Most of the patients were in the second decade of life
- 9 Spontaneous recovery is unknown and recurrences have taken place in those cases in which the entire cartilage was not removed
- 10 Pain is present on complete extension and on acute flexion of the knee

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TABLE VII—RESULTS OF RADIUM TREATMENT FOR FIBROMYOMATA

Dosage	Cases	T	Effect on menstruation					Effect on tumor					Symptoms of menopause					Health	Death	Late treatment
			C	R	N	R	U	C	P	U	E	N	M	M	S	N	T			
Group 1 001 400 mg. ho	36	33		19	19	1	1		4	4	7	2	0	11	9	1	15	30	12	1
G 2 300 to 900 mg. ho	5	15	78	37	7		3	20	20	4	88	18	20	46	11	37	87	25	30	21
G 3 1000 to 2000 mg. ho	37	9	5	3				6	5	5	15		1	18		7	8	3	3	1
G 4 0 mg. ho	1			1							1					1	1	6	0	

of choice for any sarcomatous condition in the uterus was endorsed by the German Congress of Gynecologists of 1920

Of the 250 patients operated on for fibromyomata replies to questionnaires have been received during the last year from 158, 21 others who did not reply had reported or had been seen at the clinic later than 1 year following the operation. For 71 patients no report of their late clinical result was available (Table VI). The results in hysterectomy with bilateral or unilateral oophorectomy have been differentiated chiefly to note whether the severity of the vascular phenomena associated with the menopause was roughly proportional to the amount of ovarian tissue removed. Apparently this is not a simple relationship but is largely influenced by other factors notably the nervous temperament of the patient. As in all subjective symptomatology it is difficult to evaluate the report of patients on this score as intense discomfort for one patient will be described as a mild reaction by a more placid person. However the fact that 2 patients still in active menstrual life had no hot flashes following double oophorectomy while 9 patients complained of severe reaction following removal of the uterus only indicates the variation in the replies.

Such symptoms as the persistence of vaginal discharge are of course not attributed to any deficiency or failure in the treatment of fibromyomata. I have endeavored however to note all of the pelvic symptoms which might necessitate later treatment by radiation or operation. Three patients were sufficiently

annoyed by persistent vaginal discharge and irregular bleeding to require later amputation of the cervix. One reported extreme discomfort because of prolapse of the cervix.

Melson found that of 2350 cases of subtotal abdominal hysterectomy for fibromyomata in only 19 was carcinoma known to have developed in the stump of the cervix a percentage of 0.8. Two of the patients in the present series had a small growth removed from the cervix later and one of these now has a recurring growth the removal of which is advised by her home physician. Another patient has a cystic tumor of the vaginal orifice. Increased pelvic pain led to the diagnosis of pelvic abscesses in 2 cases these were drained in both instances. The abdominal wound opened in 1 case after the return of the patient to her home while in 2 patients hernias developed at the site of operation. In 1 case complicated by bilateral tubo ovarian abscess a vaginal fistula developed probably at the site of drainage while in one carcinomatous case of bilateral cystadenoma a rectovaginal and vesicovaginal fistula developed with the recurrence of the disease. There is no evidence of a recurrence in the case reported sarcomatous.

Among the immediate surgical accidents was the death of one patient from pulmonary embolism on the eighth day and of a second patient whose primary operation was for ruptured appendix, from peritonitis on the twelfth day surgical mortality of 0.8 per cent resulting.

A composite survey of results from radiation would be of little value since the dosage and



Fig. 1 Case 1 Transverse irregular fracture through medial third of left clavicle with marked displacement and overriding



Fig. 2 Case 1 Medial third of left clavicle two weeks after reduction showing very good alignment and a small amount of bones

ulna united promptly. Four months after the fracture roentgenograms of the radius showed much callus formation but there was non union. All bones of the forearm showed atrophy. Five months later there was still no union of the radius, therefore a bone graft was placed. No infection followed this operation. Ten months from the date of the bone grafting all splints were removed but a leather brace was used as the graft did not grow; there was still non union and the bone graft was being gradually absorbed.

DIAGNOSIS

In all of these fractures the diagnosis was based on X ray findings. In no instance did

we depend on physical examination alone. We are firmly convinced that many fractures are overlooked even after the most painstaking physical examination if an X ray picture is not made. On the contrary, many cases will be diagnosed as fracture when a physical examination and the history are depended upon without the aid of the roentgenogram. We regard the negative X ray report in many cases just as valuable both to the patient and the surgeon as the positive finding. Many years ago the writer formulated the following



Fig. 3 Case 2 Transverse fracture through center of right patella with complete separation of fragment



Figs. 4 and 5 Case 2 Functional results 3 months after open repair

TABLE IX.—OPERATIONS SUBSEQUENT TO RADIUM TREATMENT (GROUP 2 TABLE VII)

Operation	Time radium treatment	Course	Pathologic findings
Exploration	15	Irrregular bleeding	Atypical disease
Exploration	5	Irregular bleeding	Carcinoma of cervix
Cauterization of cervix	1	Irregular bleeding	Three months pregnancy later terminated to cause fibromyoma
Curetting	Immediate	Abortion	Uterus matted in adhesion with inflammation of Douglas
Hysterectomy	0	Tumor not detected	Adenomyoma of uterus
Hysterectomy	3	Tumor not detected	Multiple fibromyomata (1 case only)
Hysterotomy	0	Excessive bleeding	Multiple fibromyomata (1 case only)
Hysterectomy	8	Excessive bleeding	
Hysterectomy	24	Excessive bleeding	
Hysterectomy	5	Irregular bleeding	
Hysterectomy	28	Irregular bleeding	
Hysterectomy	35	Irregular bleeding	
Hysterectomy	5 years	Pelvic pain	
Hysterectomy	7	Pelvic pain	
Hysterectomy	8	Symptoms controlled	
Hysterectomy	3	Symptoms controlled	
Hysterectomy	4 years	Atypical disease	
Hysterectomy	6	Tumor not detected	
Hysterectomy and myometrium			
Hysterectomy with salpingectomy and oophorectomy			
Hysterectomy with salpingectomy and oophorectomy	3	Acute pelvic inflammation	
Hysterectomy with salpingectomy and oophorectomy		Acute pelvic inflammation	

ation was given in 20 instances (15 per cent). Twenty-one patients were operated on (Table IX).

One patient whose profuse bleeding was not controlled died a few months after her treatment. Three patients have been advised to return for observation each having reported symptoms suggestive of possible malignant change. Bédard's belief that a return of menstruation not accompanied by prompt cessation of the vascular phenomenon of the menopause is probably due to malignant disease of the pelvic organs may prove helpful in the differential diagnosis in such cases.

One patient in this group illustrates an unusual continuance of ovarian activity. When she was first seen at the age of 61 the menstrual periods were irregular and profuse. On bimanual examination a large hard irregular uterus was palpated. Six hundred mil-

ligram hours of radium were applied in April 1919. This was followed by cessation of menstruation for 8 months. In April 1921 she was given 1,000 milligram hours of radium and menstruation ceased for four months. Since August 1921 menstruation has been regular and profuse. The patient is in good health except for periods of weakness due to excessive flow.

In Group 3 patients receiving from 1,000 to 2,000 milligram hours of radium only 2 are known to have received further radiation. Two were operated on one 5 months after treatment because of dysuria for which the pressure of the fibromyoma on the bladder was responsible the second according to her local physician's report at her own request 6 months after treatment in order to prevent later complications. The fibromyoma was apparently responding to treatment satis-



Fig. 11 Case 5 Transverse fracture of right radius and ulna showing angulation overlying and displacement of bones



Fig. 12 Case 5 Three and a half months later showing results of reduction and callus formation without open operation

ture or the fracture was badly compounded. By simply enlarging the opening by direct open manipulation the reduction could be made more accurately and with less trauma. With few exceptions we are bitterly opposed to the open operation for the reduction of

fractures and the fact that we did only 33 open operations in 1527 fracture cases prove our conservatism in this regard. We believe that the less skill the less experience the less patience the bone surgeon has the more he is inclined to do the open operation for the



Fig. 13 Case 6 Roentgenogram taken after two attempts to reduce fractures



Fig. 14 Case 6 Roentgenogram showing results after open operation

TABLE XI—RESULTS OF TREATMENT WITH RADIUM AND ROENTGEN RAYS (65 PATIENTS)

Dose	Cases	Effect menstruat				Effect tumor				Symptoms at pause				Health		Lives		Total
		Cases	Effect	Effect	Effect	Effect	Effect	Effect	Effect	Effect	Effect	Effect	Effect	Effect	Effect	Effect	Effect	
Uterine mass reduced by radium and roentgen rays	2	0	5															8
So far as 500 mg. hours of radium and roentgen rays	6	4	5	1		6	0	8	6	4	7	4	3	17		6	3	6
On the 100 mg. hours of radium and roentgen rays			6	1		3	3	3	3		2	2	3	3	3		3	3
100 mg. hours of radium and roentgen rays	7	6	5			1	3							5	1			7

been advised. I agree with Beckler that an adnexal mass not responding promptly to radiation should be regarded as probable malignant disease of the ovary.

The treatment of fibromyomata with roentgen rays is particularly free from serious complications. In no case has there been an inflammatory pelvic reaction. One patient with a history of recurring acute pelvic inflammations was treated without reaction. Three years later her admission for treatment of acute pelvic inflammation demonstrated the potential activity of the focus. No deaths from the use of roentgen rays have as yet been reported although the number of cases so treated is constantly increasing. Beckler reports with his technique (which would correspond most closely to the Mayo Clinic 135 kilovolt setting) favorable results in the arrest of excessive menstruation in 98 per cent of cases and complete reduction of tumors in 24 per cent.

The two operations noted in the second division of Table XI were due to failure to reduce the tumor and in each instance a benign growth was found. In the third division however the tumors operated on were definitely malignant. Two patients offered serious surgical risk on account of obesity and exsanguination from profuse hemorrhage. One was operated on 4 months after the radiation treatment and extensive carcinoma of the body of the uterus and multiple fibromyomata were found. The second patient was explored elsewhere 8 months after her treatment and inoperable malignant neoplasm

found. In the third case the size of the tumor remained satisfactorily reduced for 3 years after 2 courses of radium and roentgen rays. The tumor then enlarged rapidly. The patient was operated on elsewhere and a portion of the pelvic mass removed. The condition was reported to be malignant. One patient suffered from a radiodermatitis from too frequent courses of roentgen rays. Areas of telangiectasis appeared over the abdomen and for a period of 2 years small areas occasionally showed ulceration but they eventually healed.

Among all the groups the period of convalescence is only roughly indicative of the degree of reaction. Patients who report a convalescence of several years following an application of less than 500 milligram hours of radium have undoubtedly confused other causes of poor general health with the particular inconvenience caused by the treatment. Many patients in all groups found that they were able to continue their usual activities without interruption.

CONCLUSIONS

In these unselected cases of fibromyomata of the uterus treated by operation and by radiotherapy a relatively high percentage of the latter group has been found to require further treatment either repeated radiation (18 per cent) or operation (13.7 per cent) as compared with 4 per cent of the surgical group who received further treatment. It is true however that more recent cases particularly after roentgenological treatment are showing definitely better results through greater experience.



Fig. 17

Fig. 18

Fig. 17. Case 8. Transverse fracture through middle of right femur showing anterior displacement of the upper or bone with slight amount of overriding.

Fig. 18. Case 8. Results 15 months after open operation. (Note that all of bone plate has not been absorbed.)

mutulating fractures of the forearm when the forearm is greatly swollen the circulation is poor and further trauma from the manipulation for reduction of the fractures would endanger the life of the limb the limb is placed in a hot pack for a few days and then the open operation is done. This same procedure is carried out in some of the mutilating fractures of the leg foot and ankle. Also in oblique fractures of the tibia when maintenance is difficult we advise the open operation.

In fractures around the elbow when satisfactory reduction and maintenance cannot be obtained by manipulation and position we believe that the open operation especially in adults offers the best functional and cosmetic results.

The method used in open operation is of the greatest importance. Some surgeons affect the no touch method with the ridiculous repeated resterilization of instruments as the important factor. The writer feels that the one factor in the success of all open operations

is the gentle handling of tissues by clean cut dissections. In doing this the blood supply to the bone is interfered with as little as possible the bone is never lifted from its bed by rough retraction unless absolutely necessary the periosteum is not disturbed the attached fragments of bone are not removed fractured ends are apposed without suturing or plating if this is possible and if this is not possible the smallest number of retention sutures or appliances is used to hold the ends in apposition. I prefer silver or bronze wire as the suture material of choice for holding the fragments in apposition. When this technique has been carried out infection delayed union or non union need not be feared.

We do not dread compound fractures when the blood supply has not been greatly damaged provided we set these cases a few hours after the injury. We shave the parts do a débridement use ether and iodine freely and suture the wounds without drainage or with just a rubber wick for 48 to 72 hours apply retention splints and do not expect infection or delayed union.

In all of our fractures of the femur in this series with the exception of the three open operation cases we used retraction with the Thomas splint and the Ballan frame. We have found that continuous traction is far more effective in reducing an overriding fractured femur than is a general anæsthetic and the Halley table. The greatest amount of traction must be put on during the first few days or until the overriding has been overcome and then the amount of the traction is lessened so that the ligaments of the knee joint are not injured. In fractures below the knee we use circular plaster casts or molded plaster splints with a foot piece.

In fracture of the humerus we use a Thomas splint while the patient is in bed and when he is up we use the plaster cast splint that holds the arm at right angles to the body. This splint is used only when it is difficult to hold the fractured ends in good apposition.

In fracture of the forearm we prefer the molded plaster splint or the anterior and posterior board splint well padded. However the kind of splint is of little importance. Accurate reduction of these fractures of the fore

THE BLOOD CALCIUM IN ECLAMPSIA

BY SAMUEL M. FEINBERG M.D. CHICAGO
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AND

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AN investigation of the blood calcium findings in eclampsia was prompted by the following considerations suggesting a possible etiological relationship between the two. In the first place it has been demonstrated that infantile tetany is associated with a decrease in blood calcium. Because of the clinical similarity of the latter condition and eclampsia it was only natural to expect similar findings here. In the second place it is evident that the mineral metabolism of the maternal organism is enormously increased during pregnancy. This is especially true of calcium in the latter half of pregnancy at which time a large amount of calcium is taken from the mother for deposition in the fetal bones. Consequently it seemed logical to assume that when the mineral metabolism of the mother is unable to stand this calcium drain a calcium poverty manifesting itself in a hypocalcemia would result and that this condition possibly had some relation to eclampsia.

Furthermore it is well known that during pregnancy osseous changes take place in the mother such as softening of the bones and dental decay all of which might be interpreted as evidence of disturbed calcium balance. It is a statistical fact that eclampsia is much more common in twin pregnancies. The increased calcium utilization in this condition would tend further to support the hypothesis that eclampsia may be due to a decrease of calcium in the blood.

THEORIES OF ECLAMPSIA

The theories of the pathogenesis of eclampsia that have been proposed from time to time are legion and cannot be discussed here not even enumerated. However for the sake of avoiding confusion it is well to realize that practically all the theories proposed fall

in one or another general group. These theories are that eclampsia may be the result of (1) intoxication of the mother with the products of fetal metabolism (2) of the entrance of the fetal or maternal elements into the maternal circulation (3) of anaphylactic reaction or (4) of the disturbance of maternal metabolism.

There are several theories concerning the pathogenesis of eclampsia that have been advanced in the last few years which have not as yet been cast among the discards. In 1923 McQuarrie (20) showed that in eclampsias there is a greater proportion of incompatibilities between the maternal and fetal blood types than in normal pregnancies. He therefore expressed the opinion that eclampsia may be due to agglutinative changes caused by the incompatible fetal blood gaining entrance to the maternal circulation. It is interesting to note that in 1905 Dienst (3) reported similar findings. Talbot (23) advanced the theory that eclampsia is caused by chronic sepsis especially that due to infected teeth.

It has been repeatedly shown that although the non protein nitrogen in the blood is as a rule increased in eclampsia the urea nitrogen is proportionately diminished while the other known nitrogenous elements are practically unaffected. This results in a considerable increase in the undetermined nitrogenous bodies. This finding has led to the expression by several (15, 16, 19) that the etiology of eclampsia may be linked up with these undetermined nitrogenous substances.

The possible association of mineral metabolism with eclampsia has been rather neglected. In 1910 Mitchell (21) expounded the theory that calcium deficiency is the cause of eclampsia. In support of his theory he cited certain theoretical considerations several of which are mentioned in the first part of

DEPARTMENT OF TECHNIQUE

AN OPERATION FOR "DANGLE FOOT"

By RUTH KJORD MORISON M A M D FRCS (Edin) FRCS (Eng) DCL LLD (Edin) NEWCASTLE ON TYNE ENGLAND

Hon ry S gen C pyles Hon Genl rth
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S gen Cryst H me Genl th

ORDINARY operative methods for the treatment of flail foot had in our experience been unsatisfactory and when I suggested to Dr Mackenzie that the ankle could be fixed by making osseous ligaments between the tibia and fibula above and the astragalus and os calcis below he agreed that the method should be tried. The suggestion was based upon my experience during the war with rebellious ununited fractures. When these were treated with osteoperiosteal grafts osteogenesis was stimulated to such an extent that large masses of callus resulted and union of the fracture followed.

The operation we have devised is simple and in the hands of orthopedic surgeons is capable of wide extension if the principles on which it is based are applied to suitable cases.

The present communication refers to the first 3 cases operated upon in which sufficient time has elapsed to prove that the fixation resulting from the operation is not just temporary. All of them were treated in the surgical annex of the Crippled Children's Home at Gosforth.

CASE 1: A boy J J aged 10½ years was admitted for right dropped foot the result of infantile paralysis. There were no movements of the ankle joint and but faint voluntary flexion of the toes.

Operation was performed February 22 1921 on the right ankle under general anaesthesia. The whole leg was elevated to a right angle with the body and a broad thin India rubber bandage was wound round the thigh to act as a tourniquet. This was the method adopted in all the cases and in all the tourniquet was removed after the completion of the first stage of the operation so that these details require no further mention.

The patient was turned over face downward and a vertical incision 4 inches long was made over the center of the back of the leg extending upward from the back of the heel. The tendo achillis was exposed by reflecting the skin on either side and was cut across. The lower end of the tibia and fibula and the upper surface of the os calcis were

exposed between the flexor longus hallucis on the outer side and the tibialis posterior on the inner. The periosteum covering these bones was incised and with a chisel (curved on the distal) and a mallet the periosteum with a thin layer of underlying bone was reflected from each for about an inch leaving four raw bony surfaces—one over the brim of the tibial epiphysis one over the fibular epiphysis a third over the inner and the fourth over the outer surface of the os calcis. This wound was covered up and compressed under a pad of gauze (Stage 1).

The leg was acutely flexed at the knee and the foot laid upon towels resting on the table. A long incision was made over the front of the leg convexity forward over the extensor muscles and a flap was reflected over the antero-internal surface of the tibia with its base outlined deeply by the internal saphenous vein. Incisions were made 4 inches long dividing the periosteum over the crest of the tibia in front and the lateral margin of the bone behind. These were joined by transverse cuts above and below outlining the area to be removed for the graft. With a chisel and mallet this was separated leaving chips and particles of bone adhering to the under surface of the periosteum. The wound was covered up and the leg was extended to its original position the first wound opened up and the graft cut into two equal parts with a strong pair of scissors. One was laid down with its bony surface on the raw bone surfaces of the fibula and outer surface of the os calcis on the outside the other on the tibia above to the os calcis below on the inner side. The grafts were fixed in position by interrupted sutures of fine catgut tied with forceps (not fingers) attaching the graft to the detached periosteum of the bones above and below the ankle. The divided ends of the tendo achillis were approximated by a mattress suture of thick catgut and the skin wounds closed.

CASE 2: J D was 11 years of age on admission to the Home for infantile paralysis. His left foot was flail. There were no voluntary movements. The left leg measured 43 inches the right 25 inches.

Operation was performed October 21 1921 with preliminary preparations as in the former case.

A J shaped incision was made over the inner side of the leg and foot the vertical portion running parallel with and half an inch behind the posterior edge of the tibia the horizontal arm extending forward over the os calcis at the junction of its middle and lower third. A flap of skin and subcutaneous tissue was reflected forward and an incision made behind and below the tendon of the tibialis anticus

On J J aged 10½ in this paper was written by the Crippled Children's Home at Gosforth. The patient was turned over face downward and a vertical incision 4 inches long was made over the center of the back of the leg extending upward from the back of the heel. The tendo achillis was exposed by reflecting the skin on either side and was cut across. The lower end of the tibia and fibula and the upper surface of the os calcis were exposed between the flexor longus hallucis on the outer side and the tibialis posterior on the inner. The periosteum covering these bones was incised and with a chisel (curved on the distal) and a mallet the periosteum with a thin layer of underlying bone was reflected from each for about an inch leaving four raw bony surfaces—one over the brim of the tibial epiphysis one over the fibular epiphysis a third over the inner and the fourth over the outer surface of the os calcis. This wound was covered up and compressed under a pad of gauze (Stage 1). The leg was acutely flexed at the knee and the foot laid upon towels resting on the table. A long incision was made over the front of the leg convexity forward over the extensor muscles and a flap was reflected over the antero-internal surface of the tibia with its base outlined deeply by the internal saphenous vein. Incisions were made 4 inches long dividing the periosteum over the crest of the tibia in front and the lateral margin of the bone behind. These were joined by transverse cuts above and below outlining the area to be removed for the graft. With a chisel and mallet this was separated leaving chips and particles of bone adhering to the under surface of the periosteum. The wound was covered up and the leg was extended to its original position the first wound opened up and the graft cut into two equal parts with a strong pair of scissors. One was laid down with its bony surface on the raw bone surfaces of the fibula and outer surface of the os calcis on the outside the other on the tibia above to the os calcis below on the inner side. The grafts were fixed in position by interrupted sutures of fine catgut tied with forceps (not fingers) attaching the graft to the detached periosteum of the bones above and below the ankle. The divided ends of the tendo achillis were approximated by a mattress suture of thick catgut and the skin wounds closed.

report 1 case of eclampsia with a finding of 8.5 milligrams per 100 cubic centimeters of serum Krehbiel (12) in another series of cases mentions a case of eclampsia with the finding of 4.29 milligrams of calcium per 100 cubic centimeters of serum

From the above consideration it is evident that either because of faulty technique or failure to present a sufficient number of cases the findings of calcium in the blood serum is as yet an unsettled matter. And it is with that in mind that the following investigation is recorded

TECHNIQUE AND SCOPE OF WORK

The determination of calcium was done according to the method of Kramer and Tisdall. Blood was drawn from the arm and the serum separated. Whenever possible 5 cubic centimeters of serum were used in the determination. To the serum in a 15 cubic centimeter centrifuge tube was added one half its volume of a 3 per cent solution of ammonium oxalate. This was allowed to stand until the following day. The sides of the tube were then rubbed with a rubber tipped glass rod. The tube was centrifuged at high speed for about 10 minutes the liquid carefully decanted, distilled water added and centrifuged again. This washing process was repeated three times. To the washed sediment were added 5 cubic centimeters of normal sulphuric acid and the tube kept at a temperature of 75 degrees C. This solution was titrated with a one hundredth normal solution of potassium permanganate. The end point was considered that point at which a faint pink remained over 15 seconds. The calculations to be used are based on the fact that each cubic centimeter of permanganate solution represents 0.2 milligram of calcium.

The blood calcium values of several cases of normal pregnancy were determined all of them shortly before delivery. The results are recorded in Table I.

Twelve cases of pre eclamptic and eclamptic toxemias were examined with the results as shown in Table II.

Several other cases at first considered as eclamptic but later proved to be erroneously diagnosed are reported in Table III.

TABLE I — BLOOD CALCIUM IN NORMAL PREGNANCY

Patient	Mg. cc. per m.
M. G.	10.69
E. M.	10.69
C. P.	10.15
P. N.	10.82
P. Mc.	11.35
C.	12.00
F.	10.80
L. B.	11.25
S. K.	10.40
N. R.	11.52
F. I.	10.03
Average	10.94

TABLE II — BLOOD CALCIUM IN PRE ECLAMPSIA AND ECLAMPSIA

Patient	Disease	Mg. cc. per m.
F. R.	Eclampsia	10.10
W. B.	Pre-eclampsia twins	9.20
L. P.	Eclampsia	10.00
A. E.	Pre eclamp. 12	9.33
M. F.	Pre-eclampsia	10.00
A. L.	Postpartum eclampsia	10.66
A. J.	Eclampsia	12.00
W. D.	Eclampsia	9.60
M. C.	Postpartum eclamp. 12	9.71
C. A.	Postpartum eclampsia	10.40
M. H.	Intrapartum eclamp. 12	11.10
N. B.	Eclampsia	10.12
Average		10.17

TABLE III — BLOOD CALCIUM IN CONDITIONS SIMULATING ECLAMPSIA

Patient	Disease	Mg. cc. per m.
M. C.	Uremia	8.50
K. W.	Chronic nephritis	9.60
R. E.	Epilepsy	10.50
N. M.	Cavernous sinus thrombosis	9.60
Average		9.55

It is evident from the above tabulations that although the calcium figures for eclampsia are somewhat lower than those for normal pregnancy the difference is rather negligible. Furthermore in several cases of pathological conditions simulating eclampsia clinically it can be seen that the calcium figures are lower than those for eclampsia.

Other points of interest that have been observed in the cases of eclampsia here recorded are worthy of mention. A history of possible disturbance in calcium metabolism was inquired into in all these cases. None of them gave any history of delayed dentition or walking. None of them had had any recognizable tetany or rachitis. None of the eclamptic



Figs 6 and 7 Case 2 Before and 3 years after operation.

Operation November 28 1921 was done on her right foot exactly as described for Case 1 so that details are unnecessary.

The photographs before and after operation and the X ray pictures show that the object of the operations have been fully realized. All of these patients have firmly fixed ankle joints and their feet are now capable of serving a useful purpose.

It will be noted that in each case there is swelling about the ankle joint. Though the X ray does not clearly show this it is due to new bone formation judged by its hard consistency on palpation.

These operations though easy require attention to every detail if success is to be assured. We make no excuse for describing our methods.

The skin covering the limb to be operated upon is prepared the night before in the ordinary way covered with sterile gauze and a bandage and these are taken off on the operating table after the tourniquet has been applied. The skin is then mopped with Harrington's solution for 2 minutes and this is wiped away with spirit. The sterilized instruments lying in 1 in 20 carbolic solution have hot water poured over them to dilute the carbolic to 1 in 60. Immediately before use the instruments are wiped dry with sterile gauze. The skin involved in the incisions is transversely scratched to allow of accurate suturing at the end of the operation. Only prepared instruments and sterile mops wrung out of warm saline are allowed to touch the wounds. No fingers gloved or otherwise being allowed. As soon as the osteopneosteal flaps are separated at each end they are



Fig 8 Case 2 Three years after operation



Fig 9 Case 2 Roentgen gram 3 years after operation

CYSTS OF THE SEMILUNAR CARTILAGES¹

REPORT OF TWO CASES OF CYST OF THE EXTERNAL SEMILUNAR CARTILAGE AND ONE CASE OF CYST OF THE INTERNAL SEMILUNAR CARTILAGE

BY NATHANIEL ALLISON, M.D. F.A.C.S. BOSTON, MASSACHUSETTS

AND

DENIS S. O'CONNOR, M.D. WATERBURY, CONNECTICUT

IN a recent article on cysts of the external semilunar cartilage by M. Jean three new cases of this unusual condition were added to the literature making a total of 18 cases reported up to that time. Accompanying the report was a review of all previously reported cases and a careful histological study of two of the specimens. This study was made in an endeavor to throw some light upon the etiology of the condition and to adduce evidence in favor of or against the presence of an endothelial or an epithelial lining in the cysts.

The histological study of the specimens was done by Professor Latulle and Dr. Seguy of St. Anne's Hospital in Paris. They found the specimens so similar that one description would serve for both of them.

Like all cysts previously reported these were multilocular and located near the external border of the midportion of the external semilunar cartilage. A composite picture of the development of the cyst was constructed by a description of the different stages in the development of the cyst as shown by different portions of the specimens.

The earliest visible evidence of change in the tissue was a localized edema which gave the characteristic staining reaction of degeneration. The tissue then became amorphous followed by a stage in which it seemed fibrillar. Spaces formed between these fibrils and filled up with a nuclear debris. The walls of the cyst showed no epithelial or endothelial lining but what on superficial examination was thought to be an endothelial lining on careful examination proved to be a layer of the cyst contents which had become adherent to the walls of the cyst. There was no evidence of hemorrhage or disease of the blood vessels in the tissues examined. There was an increase in the number of cartilage cells in the diseased tissue.

The French investigators reached the conclusion that the condition under discussion was a pseudocyst due to degeneration of fibro cartilage from unknown cause.

Phemister (2) in the first 7 cases reported from this country found a lining of mature connective tissue.

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At this time we wish to report 2 new cases of cyst of the external semilunar cartilage and one new case of cyst of the internal semilunar cartilage. While in some respects the cyst of the internal cartilage resembles the case reported by Fisher (3) yet this cyst was so much a part of the cartilage that it could not be removed without removing the cartilage and therefore has been classified as a cyst of the cartilage rather than as a cyst between the cartilage and internal lateral ligament as was done by Fisher.

CASE 1. A female 21 years of age came to the Orthopedic Outpatient Department of the Massachusetts General Hospital on December 9, 1924 complaining of pain in the right knee of 1 year's duration and difficulty in walking after resting. She could remember no injury to which to ascribe the condition.

Examination disclosed a localized resilient swelling about the size of an American walnut on the lateral aspect of the right knee in approximately the joint line. It was tender on pressure. The mass was under the external lateral ligament and was evidently adherent to the deep structures upon which it rested. Pain was relieved by flexion of the knee to 80 degrees. Roentgenograms showed a soft tissue shadow at the point corresponding to the location of the tumor mass. The blood Wassermann was negative.

A diagnosis of cyst of the external semilunar cartilage was made. The patient admitted to the ward and operated upon on January 8, 1925. A transverse incision was made over the lateral aspect of the knee directly over the tumor mass. When the fibers of the external lateral ligament were separated the tumor pushed through into the opening. The cyst with the semilunar cartilage was removed (Fig. 1).

¹ From the Orthopedic Surgery Department of Massachusetts General Hospital, Boston, Massachusetts.

A SIMPLE METHOD FOR CORRECTION OF DEFORMITY IN BONY ANKYLOSIS OF THE HIP JOINT¹

By LEON C. ABBOTT, M.D., F.A.C.S. AND IRVING A. JOSTES, M.D. St. Louis, Missouri

THE treatment generally indicated in ankylosis of the hip joint with deformity is correction of the deformity by osteotomy of the femur with immediate realignment and fixation of the limb in a good functional position for weight bearing. The simplest and the most frequently employed type of osteotomy consists of a transverse section of the bone just below the level of the trochanters. The objection to its use, however, is that in severe deformities, after the osteotomy is completed the bone ends frequently slip by when the deformity is corrected. This may lead either to non union or union with shortening in either case the result is bad.

To overcome this difficulty various types of osteotomy have been devised the best known of which are the cuneiform osteotomy and the curved osteotomy of Brackett. The former consists of the removal of a wedge of bone with its base facing in a direction varying with the character of the deformity present. In the latter the section of the bone is curved and correction of the deformity is obtained by rotation the convexity of the lower fragment turning within the concavity of the upper. Slipping of the bone ends is prevented by the shelving edges of the upper fragment. Neither

of these methods, however, constitutes an absolute safeguard against displacement of the fragments moreover in certain deformities they have not proved suitable. If the hip is ankylosed in a position of extreme abduction flexion and external rotation it is often impossible to plan either a cuneiform or curved osteotomy with any reasonable assurance that the component parts of the deformity will be corrected. Even if the plan seems feasible its execution is attended by serious technical difficulties and because of the marked contracture of the soft parts immediate correction of the deformity is almost certain to be followed by a displacement and overriding of the fragments. It was just such a deformity in a young lad admitted to the Shriner's Hospital for Crippled Children which lead to the development of the method of treatment to be described.

The method is based on the principle of treatment of mal united fractures which has been emphasized by Sir Robert Jones (1922). He has shown, for example, that in recent mal union of the femur correction of angulation can be secured by gradual pressure over the site of fracture and by extension of the leg on a Thomas splint. In certain cases manipulation under anesthesia followed by the application of strong traction may be necessary. One of us (L. C. A.) has combined manipulation and caliper extension in a

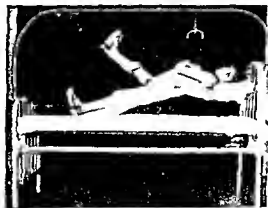


Fig. 1. Illustrating the method of securing fixation after osteotomy of the femur for correction of flexion and abduction deformity of the right hip. The position of deformity is maintained by fixing the lower end of the Thomas splint to a long tubal arm until callus is formed. The adjustable socket into which the tubal arm fits permits of a gradual change in the position of the splint until the deformity is corrected.

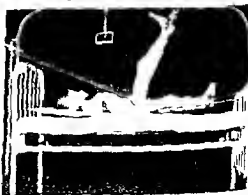


Fig. 2. Illustrating the method of fixing the pelvis in correction of flexion deformity of the left hip. Traction is applied to the left leg while the right is held on a Thomas splint with the hip flexed and the knee extended. In this position the taut hamstrings prevent hyperextension of the spine.

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BY LEROY C. ABBOTT M.D. J.A.C.S. AND FRID A. JOSTES M.D. St. Louis Missouri

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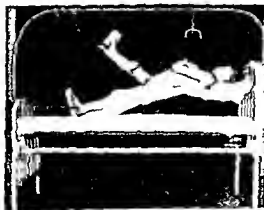


Fig. 1 Illustration the method of securing fixation after osteotomy of the femur for correction of the severe abduction deformity of the right hip. The position of the deformity is maintained by fixing the lower end of the Thomas splint to a long tubular arm until the hip is fixed. The adjustable socket into which the tubal arm fits permits of a gradual change in the position of the splint until the deformity is corrected.

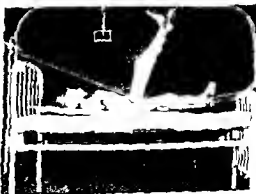


Fig. 2 Illustration the method of fixing the pelvis in correction of flexion deformity. The left leg traction is applied to the left leg while the right is held on a Thomas splint with the hip flexed and the knee extended. In this position the taut hamstrings prevent hyperextension of the spine.

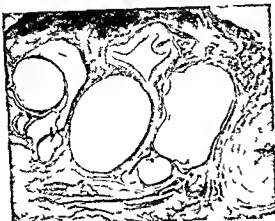


Fig 3 Photomicrograph of specimen from Case 2 shown in Figure 2



Fig 5 Photomicrograph of specimen from Case 3 shown in Figure 4

the wound had healed nicely there was no intra articular or extra articular swelling there was a complete range of motion and no abnormal mobility

The following is a report of the histological examination of the tissues by Dr S Burt Wolbach Professor of Pathology Harvard Medical School

There are three specimens submitted from different cases. They all show similar appearances and the same apparent sequences so that one description applies to the three.

The largest cysts including those of a millimeter in diameter upward are surrounded by dense fibrous tissue of concentrically arranged cells and intercellular material so that the effect is almost that of a laminated wall. Occasionally on the inner surface of this wall there are flattened nuclei belonging to cells without demonstrable cytoplasm. The contention that these cells are endothelial (or mesothelial) might well be raised if the study of smaller cavities did not indicate a different origin.

The larger cavities are situated toward the periphery of the cartilages as one passes inward smaller cavities are found some of which are lined and in a few instances partially filled with a fibrin like material. This fibrin like material is undergoing avascular organization by cells derived from the surrounding fibrous tissue in the neighborhood. Toward the inner margin of the cartilages there is a profound change of the texture of the fibrocartilage giving an appearance of irregular areas slightly stained or not stained at all traversed and surrounded by normal appearing densely stained fibrous tissue of a character found in fibrocartilage. In but few places in any of the three specimens can cartilage normal for fibrocartilage be found. The appear-

ances indicate that the first step in the sequences of cyst formation is a dissolution of the cartilage matrix and disappearance of the cartilage cells. In the specimen from Case 3 some of these areas contain deposits of amorphous calcium salts. In all three specimens one finds in this rarified and oedematous appearing tissue small cavities most of which contain a deposit of fibrin like material. There are evidences of reparative reaction on the part of fibroblasts in all three specimens but most noticeable in that from Case 1 and here there is a striking avascular organization of degenerated areas. Clusters of cartilage cells indicate that chondroblasts are playing some part in this repair but the general effect of the repair is to isolate by organization foci containing liquid and fibrinoid material. Evidence also of the coalescing of small cavities is present. At the peripheral border of the cartilage there seems to be an increase in vascularity as if there had been new capillary formation. There is no inflammatory reaction other than occasional lymphoid cells and the presence of mononuclear phagocytes containing hemosiderin pigment. Small arteries and veins are normal.

I should answer your inquiries regarding special staining of the cysts in the negative. The interpretation of my brief report is that the cavities arise in foci of degeneration in the fibrocartilage taking origin in the matrix of cartilage and it would seem that in some instances this should lead to the formation of calcified deposits demonstrable in gross as is evidenced macroscopically in Case 3. The ordinary sequence however in these semilunar cartilages seems to be the formation of cavities due to the accumulation of liquid probably by osmosis. The character of the fibrinoid material should be investigated through appropriate staining methods. I suspect that it is not fibrin but an atypical product of adjacent fibroblasts. It eventually becomes com-

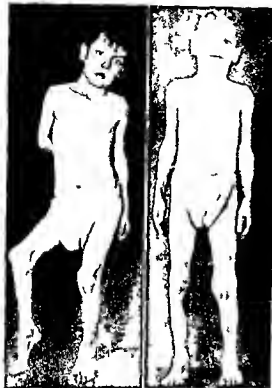


Fig. 7

Fig. 9

Fig. 7 Case 1 Condition on admission Abduction flexion and external rotation of the right hip Patient walks with only the toes touching the ground

Fig. 9 Case 1 Correction of deformity obtained by osteotomy of the femur and a gradual bending of the callus

The desired position for function is maintain d until consolidation of the callus has taken place The description of the method is best given under the following headings

- 1 Subtrochanteric osteotomy of the femur
- 2 Fixation of the leg until the fragments are imbedded in the callus
- 3 Gradual correction of the deformity
- 4 Protected weight bearing

Subtrochanteric osteotomy of the femur If the deformity is one of abduction and external rotation a vertical incision 4 to 5 inches in length is made on the anterior aspect of the thigh beginning just below the anterior superior spine of the ilium The deep fascia is divided in the line of the skin incision and the interval between the tensor fasciæ femoris and sartorius is seen When these two muscles are separated the tendinous portion of the rectus is exposed and on its lateral aspect is the upper part of the vastus lateralis

At this stage it is usually necessary to ligate the transverse branch of the lateral circumflex artery The femur is exposed by retracting the rectus muscle inward and the vastus lateralis muscle outward A vertical incision is made through the periosteum and a transverse osteotomy is performed The periosteum and deep structures are approximated by interrupted catgut sutures while the skin is closed with silk The limb is then fixed in its position of deformity by applying a Thomas splint with adhesive traction

In flexion and adduction deformities we have made the incision on the posterior external aspect of the trochanter and upper femur A part of the fibrous expansion of the gluteus maximus is divided with exposure of the vastus lateralis This muscle is divided in the line of its fibers and the periosteum is incised vertically A transverse subtrochanteric osteotomy is then performed and the wound closed in the manner described in the preceding paragraphs

Fixation of the leg until the fragments are imbedded in callus The patient is placed on a Bradford frame the upper end of which is suspended to the head of the bed by heavy leather straps This arrangement permits use of the bed pan without changing the position of the patient In our first case we secured immobilization of the leg by pillows and sand bags but more recently we have made use of an overhead bed frame Our bed frame is a modification of the frame designed by Robert Morison of the Royal Infirmary Edinburgh It is constructed of gas pipe with upper and lower uprights which clamp on the ends of the bed They are joined by a horizontal bar Adjustable sockets into which can be fitted tubal arms of various lengths allow for fixation of the limb in any position desired The frame is portable and can be easily and quickly adjusted The leg is immobilized in the position of the deformity by maintaining traction and fixing the lower end of the Thomas splint to a horizontal tubal arm (Fig. 1) At the end of the fourth or fifth week the roentgenogram will usually show abundant callus surrounding the bone ends We are now ready to begin the correction of the deformity

Gradual correction of the deformity The correction of the deformity is secured by a gradual change in the position of the leg Figure 1 shows the leg held in abduction and flexion In such a case the treatment is begun by turning the tubal arm downward and inward Each day the lower end of the Thomas splint is brought a little nearer to the midline With each successive change there is a bend in the callus surrounding the fragments This bend is not acute but grad

FRACTURES

A BRIEF ANALYSIS OF ALL THE FRACTURES TREATED AT THE NEWELL CLINIC AND SANITARIUM DURING THE YEARS 1920-1924 INCLUSIVE¹

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DURING the years 1920 to 1924 a total of 1,527 fractures were treated at the Newell Clinic and Sanitarium of Chattanooga, Tennessee. These cases may be divided as follows:

Fractures	Cases
Chest	90
Elbow	22
Femur	39
Bones of the foot	326
Bones of the hand	338
Bones of the head and face	90
Humerus	9
Knee including patella	42
Leg including both tibia and fibula	139
Bones of the pelvis	53
Scapula	21
Cervical	20
Spine	33
Ribs	182
Ulna	5

In 35 of these cases (which of course does not include the operations necessary for fractures of the skull) it was necessary to do open operations as follows:

Open operation	Cases
Clavicle	1
Humerus	1
Ulna	3
Femur	3
Radius and ulna	5
Tibia and fibula	6
Patella	6
Mandible	4
For depressed zygomatic arch	5

The most impressive fact found by this review of our cases was that there was only one non-union in all of the 1,527 fractures and this was a fracture of the radius. In this case it was necessary for the patient to wear a supporting brace for more than 2 years before the union became firm. But without any other treatment than an ambulatory brace to his leg, the union became firm and now he walks without a limp, has no pain and there is no deformity. In another case of fractured tibia, firm union was delayed for 1 year and in

several other cases of fractured tibia, firm union was delayed for 6 to 10 months. The treatment in all of these cases was an ambulatory splint after the first 2 months following the fracture. In no other bone in this series was there any marked delay in the normal time for firm union of the fracture.

There was 1 case of Volkmann's contraction in this series. The history of this case was as follows:

A boy, age 15, had fallen about 10 feet from a tree and landed on outstretched left hand, fracturing both radius and ulna in the upper third. The X-ray showed marked overriding of both fractures. There was much swelling of the entire forearm and circulation in the hand was poor. Under general anesthesia the fractures were reduced and the forearm put up in anterior and posterior board splint well padded. The patient was put to bed in the hospital with an electric pad surrounding the splinted forearm. He was kept in bed in the hospital for 4 days under close observation. Before he left the hospital the bandages were removed, the forearm inspected and the splints loosely reapplied. At this time the circulation in the hand and fingers was very good but there were numerous blebs over the forearm. We removed the dressings and gently massaged the soft parts every few days and often every day for several months. In spite of all this precaution the patient developed a serious Volkmann's contraction.

I believe now that if I had not reduced the fracture at once but waited a few days for the swelling to subside and then done a careful open operation I would not have had this contraction.

The history of the only ununited case is briefly as follows:

A white man, age 39, had the right hand, forearm and arm caught in a belt. The injury consisted in a transverse fracture of the right humerus in the middle third and an oblique fracture of the right ulna and radius $1\frac{1}{2}$ and $3\frac{1}{2}$ inches respectively from the wrist joint. Under general anesthesia the fracture was reduced. Anterior and posterior moulded plaster splints were applied to the arm and an anterior and posterior board splint was applied to the forearm. The bones of the humerus and of the

¹Read before the Tennessee State Medical Association, Nashville, Tennessee, April 21.



Fig. 11



Fig. 14

Fig. 11. Case 3. Condition on admission. Flexion, abduction and internal rotation of the right hip.

Fig. 14. Case 3. Position of correction secured by osteotomy and gradual molding of the callus.

During the period of consolidation of the callus the thigh and calf are massaged and the quadriceps muscle is exercised. After the apparatus has been removed exercises of the knee are begun. There will be some stiffening of this joint incident to immobilization, but this is readily overcome by a competent physiotherapist.

Protected weight bearing. As the tests for consolidation of callus are not absolute we have found it a good practice to use a protective weight bearing appliance when the patient becomes ambulatory. For this purpose the Thomas walking caliper splint is both simple and practical. It is worn for several months and gradually discarded. It is finally removed when careful and repeated observation shows no tendency to any increase in the deformity at the site of osteotomy.

The advantages of this method of correcting deformities of the hip joint are that it renders

unnecessary the use of complicated osteotomies. A simple operation is substituted for a difficult one. Through its use the contracted soft parts are gradually stretched so that there is little risk of displacement of the fragments. In the ordinary osteotomy the limb is fixed postoperatively in a plaster of Paris spica and it is very difficult to determine whether the desired position of correction has been obtained without resorting to frequent changes of plaster. With this method the limb is free for inspection throughout the treatment and the necessary changes can readily be made.

RESULTS

Four cases have been treated by this method. The first 3 had deformities of abduction, flexion and external rotation. The type of deformity present is shown in Figures 3 and 4. One patient had a quiet tuberculosis of the hip with a deformity of adduction, flexion and internal rotation. Correction of the deformity was obtained and there was great functional improvement in every case.

The difficulties of determining the presence of bony ankylosis of the hip joint was forcibly demonstrated by Case 2. An incomplete bony ankylosis was suspected after a study of the roentgenograms, but a careful examination under anesthesia failed to detect motion. A subtrochanteric osteotomy was performed and the roentgenograms (Figs. 8 and 10) show that the greatest amount of correction was secured through motion of the hip joint. In all probability correction of the deformity could have been secured without osteotomy. In the fourth case there was some displacement of the fragments which was probably brought about by inadequate fixation of the limb while waiting for callus to form. In deformities in which fixation is difficult it would seem desirable to apply a plaster of Paris spica and remove it by bivalving before operation. Immobilization could then be obtained by its reapplication following operation.

The results obtained in these 4 patients were excellent and we feel justified in advocating the method as a substitute for the ordinary osteotomy. It will be found extremely useful in correction of complicated deformities of the hip joint with bony ankylosis.

CONCLUSIONS

1. Correction of the deformity in ankylosis of the hip joint is generally secured by a subtrochanteric osteotomy of the femur. In cases with marked deformity, however, there is a great risk of displacement and overriding of the fragments.



Fig. 6 Case 3 Transverse (compound) fracture of both distal thirds of the right tibia and fibula with displacement



Fig. 7 Case 3 Results after reduction (open operation) without use of retention sutures or plate



Fig. 8 Case 4 Showing flexion of patient's fingers when he appeared for treatment for Volkmann's contraction



Fig. 9 Case 4 End results shown complete extension of fingers

rule which is rigidly carried out in our clinic. Whenever the blow or trauma has been sufficient to cause a fracture an X-ray plate must be made whether or not the physical findings indicate fracture. On hundreds of occasions we have been justified in this practice and we never offer any apologies for the extra expense the patient or industry has to bear for we know full well that if we did less the patient, industry and the attending surgeon would all suffer thereby.

TREATMENT

We find that in this series of 157 fractures it was necessary in our opinion to do only 35 open operations. Open operation was used when we could not properly reduce the frac-



Fig. 10 Case 4 Roentgen gram of arm in cast following operation for shortening of both bones



Fig 16



Fig 19

Fig 16 Case 4. Condition on admission. A marked deformity of abduction and flexion.

Fig 19 Case 4. Final result. Complete correction of the deformity.

June 5 1924. The postoperative convalescence was uneventful. Dressing of the wound showed it to be clean. Immobilization of the leg was continued.

June 17 1924 the roentgen ray examination showed abundant callus formation with no displacement of the fragments. During the next 3 weeks the deformity was corrected by gradually adducting and internally rotating the leg. June 28 1924 the roentgen rays showed a bending of the callus and no displacement of the fragments. Immobilization was continued until August 23 when the roentgenograms indicated consolidation of the callus (Fig 5). The wound completely healed. A Thomas walking caliper splint was applied and worn until the first week in October. It was then gradually discarded and the patient was discharged from the hospital October 29.

January 19 1925 the patient returns to the hospital for observation and examination showed about 20 degrees of abduction and 20 degrees of flexion. There is no pain and he walks with only a slight limp. The functional result is excellent (Fig 6).

CASE 2. A P. a male age 7 was admitted to the Shriners Hospital for Crippled Children August 9 1924 complaining of deformity and stiffness of the right hip. In February 1924 the patient fell down a flight of steps

injuring the right hip. For the next 2 weeks there was pain in the hip and fever. An abscess formed and was lanced. Drainage continued for about 3 weeks when the wounds were healed. Weight and pulley traction were used during the acute stage. When these were removed the leg was drawn upward until it reached its present position of deformity. Now he walks with the right leg held in wide abduction and with only the toes touching the ground.

Physical examination. The patient is a fairly well developed boy with the right hip held in a position of extreme abduction flexion and external rotation. In walking only the toes on the right side touch the ground and the gait is very awkward. No motion can be detected in any direction. There is no pain or sensitiveness of the joint (Fig 7).

Roentgen ray examination August 19 1924 showed the thigh abducted 90 degrees. There is destruction of the joint cartilage. The diagnosis is suppurative arthritis of the right hip joint and incomplete ankylosis (Fig 8).

At operation August 23 1924 a subtrochanteric osteotomy was done through the usual anterior incision. The leg was held in the position of deformity by traction on a Thomas splint. This was maintained for 15 days.

September 8 1924 correction of the deformity was begun by gradual adduction of the leg. September 23 1924 roentgen ray examination showed correction of the deformity with the fragment held in a mass of callus. The leg was then immobilized for 6 weeks.

Roentgen ray examination October 30 1924 showed complete correction of the deformity with union of the fragments. It was interesting to note here that the deformity was corrected by movement both of the hip joint and at the site of osteotomy. It seems likely that correction of the deformity could have been secured without osteotomy. Knowing that there was not complete ankylosis of the joint a short plaster of Paris spica was applied and the patient allowed to walk. January 1 1925 he was discharged from the hospital wearing the plaster spica.

April 1 1925 the spica was removed and the examination showed the hip held in slight abduction and slight flexion. He walked with only a slight limp (Fig 9). The roentgen ray examination (Fig 10) showed correction of the deformity with solid union of the fragments. A new spica was applied and hivalved. The patient was to return in 6 months.

July 10 1925 a letter from the family doctor stated that 2 months ago the patient fell and sustained a supracondylar fracture of the left femur. This has healed in good alignment and with full length. The position of the hip is excellent and he walks with only a slight limp.

CASE 3. V G. a female age 15 was admitted to the Shriners Hospital for Crippled Children September 19 1924 complaining of stiffness and deformity of the right hip. At 18 months of age the patient had difficulty in walking and the hip seemed stiff. There was pain in the right knee and fever at irregular intervals. The hip gradually became deformed but at 3 years of age the child began to walk. She has not been under the care of a physician and at the present time 13 years after the onset there is an extreme deformity of the hip which makes walking very difficult.

Physical examination. The general examination is negative. The right hip is fixed in a position of 70 degrees flexion and 15 degrees adduction (Fig 11). There is about 3 inches of shortening the major portion of which is confined to the femur. No motion is present in the hip in any direction. The gait is extremely awkward due to the very marked deformity and shortening.

Roentgen ray examination September 9 1924 showed an old destructive process of the right hip. The head and most of the neck of the femur were missing. The diagno-



Fig. 6 Case 3. Transverse (compound) fracture of both distal third of the right tibia and fibula with displacement.



Fig. 7 Case 3. Results after reduction (open operation) without use of retention sutures or plate.



Fig. 8 Case 4. Showing flexion of patient's fingers when he appeared for treatment for Volkmann's contracture.



Fig. 9 Case 4. End results showing complete extension of fingers.

rule which is rigidly carried out in our clinic. Whenever the blow or trauma has been sufficient to cause a fracture an X-ray plate must be made whether or not the physical findings indicate fracture. On hundreds of occasions we have been justified in this practice and we never offer any apologies for the extra expense the patient or industry has to bear for we know full well that if we did less the patient, industry and the attending surgeon would all suffer thereby.

TREATMENT

We find that in this series of 157 fractures it was necessary in our opinion to do only 33 open operations. Open operation was used when we could not properly reduce the frac-



Fig. 10 Case 4. Roentgenogram of arm in cast following operation for shortening of both bones.

splint was fixed to a long tubal arm of an overhead bed frame

October 30 1924 Convalescence was uneventful The stitches were removed and the wound showed healing by first intention

Röntgen ray examination November 29 1924 showed sufficient callus to allow for correction of the deformity As there was marked flexion the lumbar spine was controlled by holding the opposite leg on a Thomas splint with the hip flexed and the knee extended Complete correction of the deformity was secured in 5 weeks Immobilization was continued and massage and exercises of the knee begun

February 2 1925 a plaster of Paris spica was applied and the patient allowed to walk

February 12 1925 the patient was discharged wearing a plaster of Paris spica

April 4 1925 The patient returned at interval of one month On this visit the roentgen rays show complete correction of the deformity and solid union (Fig. 13) The hip is held in excellent position with only slight flexion and slight abduction He walks with scarcely any limp (Fig. 19) The functional result is excellent

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Fig. 15. Case 7. Transverse fracture of proximal third of right femur with displacement and overriding of the fragments.

reduction of fractures. Despite our general antagonism to the open operation for reduction and maintenance of fractures there are some fracture cases in which we always advise the open operation.

In the fractured patella we always operate unless there is some reason why we should not because it has been our experience that we get better results from the open operation. When the fracture is caused by a direct blow on the patella and the ligaments are apparently not torn then an open operation may not be necessary but even in these cases when the fragments cannot be easily held in accurate apposition by position and splints we do the open operation. When the fracture is due to muscular violence we always do the open operation because in these cases the ligaments have been torn and unless they have been

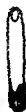
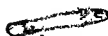


Fig. 16. One and a half months later showing results gotten with traction in a Thomas splint and Balkan frame after failure to reduce on Hawley table under anesthesia.

carefully sutured a normal knee joint cannot be expected.

In depressed fractures of the zygomatic arch we have found that we get the most perfect results by the open reduction which is usually done under local anesthesia.

In fractures of both bones of the forearm we have at times been unable to get satisfactory reduction and maintenance without an open operation on one or both bones. In these cases when repeated efforts at reduction have failed we have found it far more satisfactory to do the open operation rather than to damage the soft parts further by renewed attempts at reduction and maintenance. In fractures of the bones of the forearm where the fragments are not easily held in place by position and splints we believe the open operation is the method of choice. In certain

plant was fixed to a long tubal arm of an overhead bed frame

October 30, 1924. Convalescence was uneventful. The stitches were removed and the wound showed healing by first intention.

Röntgen ray examination November 28, 1924 showed sufficient callus to allow for correction of the deformity. As there was marked flexion the lumbar spine was controlled by holding the opposite leg on a Thomas' plant with the hip flexed and the knee extended. Complete correction of the deformity was secured in 5 weeks. Immobilization was continued and massage and exercises of the knee begun.

February 2, 1925 a plaster of Paris cast was applied and the patient allowed to walk.

February 12, 1925 the patient was discharged wearing a plaster of Paris cast.

April 4, 1925. The patient returned at intervals of one month. On this visit the roentgen rays show complete correction of the deformity and solid union (Fig. 18). The hip is held in excellent position with only slight flexion and slight abduction. He walks with scarcely any limp (Fig. 19). The functional result is excellent.

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arm is essential if we are to get 100 per cent functional and cosmetic results whereas in fractures of the femur, if we have good alignment, we are content with 10 per cent apposition. In fact we would not think of doing an open operation on the femur in a child even though nothing more than the edges were apposed because in children bone defects of the femur have such a marvellous faculty of becoming corrected. In adults we are never content with less than 10 per cent approxima-

tion but in only 3 of 50 cases has it been necessary to do more than to use continuous traction with properly placed pads to get this amount of approximation.

Our fractures are inspected often, splints being removed and soft parts massaged as we believe this prevents non union by stimulating the circulation in the limb prevents pressure injury to the soft parts prevents atrophy of muscles and gives an opportunity for early passive motion in the joints.

physical exertion. There was no union between the ends of the fractured ribs as might be expected and inspiration still caused considerable retraction of the sternum but the patient apparently experienced no discomfort.

A follow up examination on January 12, 1925 showed her to be in good health. There was no conspicuous deformity of the chest although the line of fractured ribs could be felt apparently united by bony union. The sternum was somewhat flattened and there was a tendency to round shoulders. Her vital capacity was 2,312 cubic centimeters. Figuring from her surface area (weight 34.2 kilograms surface area 1.17 square meters. Benedict and Tallot) this is very close to normal according to the tables of vital capacity in children given by Wilson and Edwards (2).

If we assume that her vital capacity before the accident was 2,000 cubic centimeters there was a marked reduction during convalescence. It could not be determined shortly after the accident for obvious reasons although it was clearly just sufficient to maintain life with great physical exertion. On the seventh day, July 24, when neither normal nor deep respiration caused apparent discomfort measurements showed

Respiratory rate	20
Minute volume	7.4 liters
Amplitude	55 cubic centimeters
Vital capacity	553 cubic centimeters

On the fourteenth day, July 3, she showed

Respiratory rate	20
Minute volume	5.15 liters
Amplitude	253 cubic centimeters
Vital capacity	736 cubic centimeters

These capacities represent roughly 28 and 38 per cent of normal.

There were two outstanding problems in this case. The first with which we are less concerned here, was that of combating shock. The second was that of attempting to readjust a badly crippled respiratory mechanism. It was at once obvious that the patient was suffering from a severe degree of anoxæmia caused by a subnormal respiratory exchange. Likewise the cause of the decreased respiratory exchange was obvious. The chest was no longer a cavity with firm walls. Inspiration caused a depression of the thoracic walls rather than a negative pressure within the lungs. Although the fracture resulted in complete separation of ribs on the left only, the flexibility of the sternum and ribs was so great that the right side of the chest wall could not be effectively expanded. The age of the patient was no doubt a large factor in the extreme mobility of the sternum. In an adult with completely ossified sternum and stiffer ribs it is doubtful whether the mobility of the sternum would be sufficient to interfere dangerously with respiration *per se* even with nearly complete separation of the ribs from it on one side although a bilateral injury might produce a similar condition. Under the conditions present following this accident the pulmonary ventilation was barely sufficient to keep the patient

alive. The use of oxygen was clearly indicated but it was doubtful whether this alone would be adequate to maintain respiration. Accordingly an attempt to fix the sternum was logical.

By the technique used in this instance the application of hooks to the sternum for the purpose of fixation must be clearly recognized as a dangerous procedure. Any puncture of the pleura causing pneumothorax under these conditions would undoubtedly be fatal. This might readily occur either at the time of application or by accidental pressure downward on the forceps at a later period. While the technique employed seemed at the time the obvious way to meet the condition it is unnecessary to run the risk of pleural puncture. As an emergency measure it would appear from the results in this case to be sufficient to grasp the skin and subcutaneous tissues over the sternum firmly with the forceps and make traction on this area. In this way we believe sufficient pull could be given during the period of reaction from shock. More certain traction without danger of pneumothorax could be obtained for a short time by making two small drill holes a short distance apart in the median vertical line of the sternum and engaging the forceps in the cancellous bone through these holes. Only the outer cortical tissue of the sternum needs to be perforated. While this can readily be done on the cadaver in practice the mobile sternum would have to be fixed with a sharp hook so that sufficient pressure to make the drill bite could be exerted. If the drill holes are placed opposite the second and third intercostal spaces they would ordinarily enter bone developed from the second center of ossification of the sternum except in very young children in whom a single hook pushed into the soft sternum will get sufficient resistance from the periosteum and pre-sternal fascia.

Traction on the sternum is suggested only as a means of combating anoxæmia due to crushing injuries causing increased mobility of the thoracic wall. Secondly through reduction of the anoxæmia diminution in the muscular effort needed for respiration and through aiding venous return to the heart by increasing the negative pressure in the great intrathoracic veins the degree of shock may be lessened. Although correction of the deformity may be secured in this way traction is not suggested for this purpose and should be abandoned as soon as the pulmonary ventilation becomes sufficient. As shown in this case a considerable deformity may be of no permanent importance. The technique used in this instance is too dangerous to recommend on account of the



FIG 1 and 2 Case 1 Before operation and after operation.

between it and the tibialis posticus on to and through the perosteal covering of the astragalus and os calcis. A chisel lightly curved on the flat was introduced through this incision down to the bone and with a series of mallet taps a raw bony area about 1 inch long by 4 inch wide was made by chipping back the perosteum and a thin under



FIG 3 Case 1 After operation.



FIG 4 Case 1 Six months after operation

lying area of bone. The tibialis posticus and flexor longus digitorum and the neurovascular bundle overlay this perosteal flap and were safely displaced backward by the underlying chisel. The perosteum covering the lower epiphysis of the tibia was divided vertically and separated by the chisel on each side leaving the bone raw and chips of it adhering to the separated perosteum on either side. This wound was now covered up by the skin flap and gauze and a J shaped incision was made on the outer side behind the fibula and over the os calcis as on the inner. The perosteum of the os calcis was divided in front of the peroneal tendons and with the chisel a similar denudation was made as on the inner side. The perosteum covering the lower epiphysis of the fibula was next divided and osteoperiosteal flaps were reflected to each side. The two sides of the ankle were now ready for the reception of the graft. The wounds were covered up and the tourniquet removed. Osteoperiosteal grafts from the antero-internal surface of the tibia were obtained as described in the previous case and placed in position without sutures, the outer reaching from the fibula to the os calcis, the inner from tibia to astragalus and os calcis and the wounds were closed.

CASE 3 Ethel W. aged 9 was admitted to the Home on September 9 1919 with infantile paralysis affecting both legs a bad paralytic scoliosis a dislocated right hip. Her right foot was flail.



FIG 5 Case 1 Three years and 10 months after operation

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

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ACCIDENT AND INDUSTRIAL SURGERY

PROGRESS and advancement in human endeavor and achievement have been accomplished only when the necessity for improvement is recognized and plans devised to bring a change. Many years ago the surgical profession realized the need for better diagnostic methods, a better knowledge of surgical pathology, and better technique in the application of surgical therapy. As a result of this understanding elective surgery has made great strides in the application of all the principles involved in this branch of the art. This progress and advancement have been due in a large part to the efficient work that has been accomplished in the large clinics and clinical centers throughout the country where a vast number of cases could be studied and where an opportunity has been afforded for clinical observation, scientific investigation and research and for ascertaining accurately the end results in this extensive clinical material.

We may point with pride to this accomplishment. However the intensive study has been confined almost exclusively to elective

surgery and the field of accident and industrial surgery has been sadly neglected for it is doubtful if there has been any material reduction in the mortality and morbidity in this class of cases during the past twenty years or since the firm establishment of aseptic and antiseptic surgery.

If the broid statement needs evidence to sustain it, analyze the fractures cared for in the larger institutions of our cities and it will be found that the end results in these cases both from an anatomical and functional view leave much to be desired and are probably no better than they were 20 years ago.

A committee was appointed by the American Surgical Association to investigate the results from our present methods of treating fractures. This committee made an exhaustive and comprehensive study of the situation and their report would seem to show the urgent necessity for some radical improvement in our methods of treating this common and serious condition which so often leads to permanent deformity and limitation of function.

Granting that the assumption is true that there is a great need for the betterment of our applied surgical therapy in the care of traumatic injuries, how can this be accomplished?

Reasoning from analogy based on an analysis of the situation prevailing in the field of elective surgery it is a fair conclusion that much could be achieved from a centralization and segregation of injury cases permitting the collection of a large enough number in one place to allow for an intensive study and investigation to be made of all angles of the problem.



Figs 10 and 11 Case 3 Before operation (1921) and after operation (1923)



Fig 12 Case 3 Three years after operation (February 12 1924)

caught by the four corners in four pairs of fine toothed catch forceps two above and two below.

If the graft is cut in two eight pairs are required. The bed for the graft is exposed by holding the edges of the divided periosteum apart with catch forceps showing the raw bone area on to which the graft has to be laid. The reasons for this are (1) to prevent the grafts from curling up or folding over and to keep them spread out ready for use and (2) to keep them from falling when detached. Bone grafts have been known after their separation to find their way on to the floor and it is well to make such a calamity impossible!

The tourniquet is removed at the end of the first stage because these patients all have cold limbs to which the blood supply is defective and damage from too long application of the constrictor is more likely to happen to them than to normal limbs. Haemorrhage has not occurred in

any of our cases and the wound is usually sufficiently dry before the grafts are in position. The grafts should be lifted directly off the tibia and placed without avoidable loss of time in their proper places. If spread out and flattened they lie in position and sutures are only an unnecessary complication. The skin wounds after the skin has been mopped all round with spirit are closed with interrupted sutures of catgut and dressed with sterile gauze on the outside of which powdered boracic acid is sprinkled from a flour dredger. Outside of this comes a thick layer of cotton wool two lateral gooch splints reaching from the tibial condyles above to the sole of the foot below fixed by an ordinary bandage. At the lower end the foot and ankle are fixed by a pat of plaster of Paris above by a broad garter of plaster of Paris and the foot and leg are hung in a cradle.

In all of our cases the dressing has not been removed for a month the wounds were then all dry and healed and the catgut was absorbed the knots lying on the dressing. After washing with spirit the leg has been put into plaster of Paris for another 6 weeks.

Whether the posterior or lateral operation is to be preferred we cannot yet decide as both have given equally good results. One advantage of the posterior incision is that only a single wound has to be made for the grafts.

These forceps now pass by the way of names some men those I dist squashed surgeons, but I recall they are always dear bed (cat h) were. The first were made in the ord of me of us (Morison) by Arch ball found some 1 in some 1 mak of Edith bough, before also and the me y was were frequently demonstrated to us as surgeons in Venetia le Infirmary b t they ve caught on till now 5 years go be they were in reduced from France. Two varieties, one a three teeth and the side w h five were the original order d they have not been improved upon.

visability of proposing and supporting some form of state medicine as a remedy

The thinker of the medical profession recognizes the fallacy of such a proposition and must take steps to forestall such a movement

FREDERIC A. BELSFY

EXTRAPLEURAL THORACOPLASTY

TUBERCULOSIS 'the great white plague' which a century ago out of each 100 000 people claimed its 300 victims today in city and country districts has a mortality of only 100 in each 100 000 while some crowded cities have cut this rate to from 40 to 60 per 100 000

Numerous observers have noted that many factors enter into this reduction of the death rate, that the white races are becoming more resistant to tubercle bacilli in other words are becoming tuberculized

We know that this disease is no respecter of races. The Chinese even under the worst possible conditions of overcrowding sanitation and hygiene show no greater mortality tables than do the Caucasians probably their greater age as a race and their longer exposure to infection having built up their resistance in spite of adverse living conditions. It is well known how vulnerable are the red and black races to this disease. Its ravages among the American Indians free from tuberculosis until contaminated by the white carriers are a matter of history. Bushnell has dramatically told how the natives of the Marquesas reacted to the disease carried to them from an older civilization.

Robert Louis Stevenson tells how whole tribes in the short span of 2 or 3 years were decimated by it. He cites one instance in which the tribe of Hapaa 300 strong was reduced to 2 survivors in less than a year after contamination by tuberculosis.

Autopsy statistics among the white races show that from 85 to 90 per cent of all persons coming to the pathologist's table exhibit evidences of having been inoculated with tuberculosis which has either failed to progress or has been overcome, a real tuberculization of the hosts.

Twenty years ago tuberculous infection of the cervical glands was common now it is extremely rare. Bovine tuberculosis especially in children finds its portal of entry in the tonsils or the pharyngeal region and manifests itself early in the lymph glands of the neck probably the now admitted infrequency of this disease is due to the testing of herd for tuberculosis thus and the pasteurization of milk destroying the menace from that greatest of carriers of bovine tuberculosis.

While the tuberculization of the race the adoption of methods which minimize the danger from bovine tuberculosis and a better understanding of how to combat the disease has tremendously lowered its mortality still its very omnipresence and the admitted mortality of 100 to each 100 000 people makes it a very real menace to society even so slowly but steadily progress has been made which offers hope of comfort and cure to the consumptive.

When the profession recognized and accepted the fact that rest good food and pure air formed the tripod upon which was based the cure of tuberculosis they made real strides toward conquering the disease.

Superimposed upon this tripod came the *Roller of heliotherapy treatment*. Then as a further expression of rest we were given artificial pneumothorax which by the introduction of gas or air into the pleural cavity collapsed the lung and gave that diseased organ real physiological rest.

This treatment marked another milestone in the fight against the disease and helped

group of mal united fractures of the femur. The details of the method of application and the results secured have been published in a previous article (3). The point of fundamental importance to the surgeon however is that in the early stages of the mal united fracture the bone ends are surrounded by a soft callus. The plastic character of the callus permits correction of the deformity by a gradual molding without serious risk of displacing the fragments.

The practical application of this principle in the correction of deformity of the hip with bony ankyllosis is realized in the following manner:

A subtrochanteric osteotomy of the femur is done and the limb is fixed in the position of deformity by applying a Thomas splint with traction. When callus has surrounded the bone end gradual correction of the deformity is obtained by changing the position of the limb. For example in abduction deformity the leg is gradually adducted until it becomes nearly parallel to its fellow. With each change in position a bending of the callus occurs. When the final position of correction is secured we have produced a definite angulation at the site of osteotomy. We have obtained correction of the deformity therefore by creating a mal united fracture of the femur but without any displacement of the fragments.

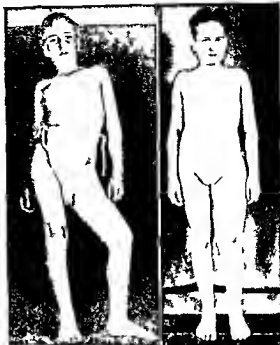


Fig. 3

Fig. 6

Fig. 3 Case 1 Condition on admission. Bony ankyllosis with deformity of abduction flexion and external rotation.
Fig. 6 Case 1 Complete correction of deformity.



Fig. 4



Fig. 5

Figs. 4 and 5. Roentgenograms showing extreme abduction deformity with bony ankyllosis and solid union of fragments after correction of deformity.

MASTER SURGEONS OF AMERICA

PHINEAS SANBORN CONNER

MY INTRODUCTION to Phineas Sanborn Conner II occurred at 6 years of age when I was awaking from that deepest sleep which comes from a tumble over the banisters and landing on one's head. Even then, the man's personality made a lasting impression. He appeared as a giant with a beak of a nose and a great long bristling moustache. He was holding my arm but he did not hurt. His big hands were firm and tender. His voice was gruff and big, but kind. Out of his eyes came the look of a friend. He was a giant but not the story book kind, and in my child's mind I quickly sensed the something in this personality that took from the beak nose, the firm set mouth, the bristling moustache those story book attributes.

Phineas Sanborn Conner, Jr., A.B., A.M., M.D., LL.D. was born in West Chester, Pennsylvania, August 23, 1839. His father was a practicing physician of modest retiring disposition, well informed but loath to display publicly his ability. The mother, Elizabeth Angelina Fair Prichard Hook Sanborn Conner, was an energetic scholarly woman who greatly influenced the molding of her son's character. Doctor Conner's ancestral tree is an illustrious one and contains the names of "Father Bachiler, who landed in Boston Harbor in 163, Daniel Webster, Justine Smith Morrill, Seth Low, Nathaniel Hawthorne, and John Greenleaf Whittier. The last describes the "Bachiler eye" as brilliant, keen, piercing penetrating. Such eyes had Doctor Conner.

The Conner family moved to Cincinnati in 1844. In 1859, after an education obtained in the Cincinnati schools, he was graduated from Dartmouth College. Returning to Cincinnati, he attended lectures at the Medical College of Ohio session 1859-1860, then at Jefferson Medical College from which he was graduated in March, 1861. During these college years, he spent some time as apothecary and acting physician in a Connecticut hospital for the insane and about six months in doing what was then termed 'walking the hospitals' in New York City. In November, 1861, he responded to the Union call. In August, 1866, the war over, he resigned and came home, having been brevetted major for gallant actions and meritorious services. His teaching career began at once with the professorship of surgery in the Cincinnati College of Medicine and Surgery, at the age of 27. This was followed in rapid succession, by other professional appointments in the Medical College of Ohio, culminating in the professorship of surgery



Fig 8

Fig 8 Case 2 Right angle abduction of the hip with in complete ankylosis



Fig 10

Fig 10 Case 2 Roentgenogram showing how correction of deformity was secured by movement at the hip joint and at the site of osteotomy. The fragments are solidly united.

ual and the roentgenograms of the completed cases show a very smooth and rounded curve at the site of the osteotomy. The time required for correction of the deformity in the average case is about 4 weeks. When this position is obtained the limb is fixed until clinical examination and the roentgenograms indicate consolidation of the callus. The apparatus is then removed and the patient allowed to move about in bed.

Control of the pelvis during the period of correction is absolutely essential. It can be secured by the application of traction to the opposite leg. In correcting the deformity of abduction traction is applied with the opposite leg held in line with the trunk in adduction with the opposite leg held in full abduction. Fixation of the pelvis and lumbar spine during the correction of flexion deformity is obtained by holding the sound limb on a Thomas splint with right angle flexion of the hip and complete extension of the knee. In this position the hamstrings are held taut and arching

of the lumbar spine false correction is entirely prevented (Fig 2).

This method of fixation with the lumbar spine suggested itself to us through the use of the Thomas test for hip flexion. To ascertain accurately the amount of flexion in pathological conditions of the hip joint Thomas prevented hyperextension of the lumbar spine by holding the flexed thigh against the abdomen. It occurred to us that the same object could be attained during the correction of flexion deformity of the hip by holding the opposite thigh at right angles to the trunk with the knee extended. This method is especially useful for correction of flexion contracture of the hip in cases of infantile paralysis. We have also found it of great value in completing extension of the hip after fasciotomy of the hip flexors. The fixation is far superior to that obtained by either a plaster jacket or strapping the pelvis to a Bradford frame. We have not observed this method in other clinics nor have we seen it in the literature.



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the doing and the art must be cultivated even more than the science. The great end and aim of medical education is to make not scholars not scientists, but healers of the sick.

Surgically, Doctor Conner's greatest contribution to the sum total of world accomplishment was his demonstration in 1883 at the Good Samaritan Hospital, Cincinnati, that the complete removal of the human stomach was feasible. A great deal of his work was original and of a daring pioneer type much of it showed a recognition of the advances made by others and the choosing of the good points from their work. As a surgeon he was alert, cool practical. When ever he appeared in the operating arena it was as the central figure. Precise in touch supple in movement he added the polish of the finished artist to the nonchalance of the experienced operator. Doctor Conner had an individuality that stood out at all times in bold relief neither conventional nor stencil made. His was an intense nature with the supremely confident air of the born chieftain.

It has been said that his military training was a large factor in producing an outward appearance of rough severity, brusqueness and irritability which to some, made him unapproachable and forbidding. Rather might not these characteristics be attributed to the long and rough road he traveled in the early years of his professional life and an added veneer he assumed to cover a sensitive warm heartedness not compatible with the requirements of the surgery of the pre-anæsthetic era? He was not much given to evaluating men publicly unless aroused to anger and then he spoke in no easily mistaken words. Someone has said. The asperities of Doctor Conner's character were an indication of his strength. This combined with his peculiar eagle eyes made a personality from which the timid usually shrank. The truth whatever it may have been was the strongest card with which to win his friendship. His attitude toward people at large was so in contrast to his attitude toward his close friends and his family that one can almost truthfully say his was a dual personality. To the one stern sharp quick gruff austere, and overbearing to the latter gentle considerate companionable and devoted.

The spoken word moves at the time and influences for the season but the written words remain. Few men have written more voluminously and better than did Doctor Conner. His contributions of written words that remain are almost innumerable and these can be found closely scattered through the medical literature of the times. The subjects of these contributions practically cover the entire field of surgery as then understood. He was associate editor of at least three surgical textbooks. He was honored by being called upon to give addresses at many national and local affairs.

Besides the army rank early obtained and the later medical college positions held Doctor Conner was president of the Cincinnati Academy of Medicine Ohio State Medical Association the American Academy of Medicine and the Ameri-



Fig. 12

Fig. 13

Fig. 15

Fig. 12. Case 3. Roentgen film showing almost complete destruction of the head and neck of the femur. Bony ankylosis is questionable.

Fig. 13. Case 3. After osteotomy of the femur showing

some displacement of the fragments probably due to inadequate immobilization following operation.

Fig. 15. Case 3. Final result. Union of the fragments with consolidation of the callus.

2. The risk of displacing the fragments is minimized by using the cuneiform and curved types of osteotomy.

3. The objections to these methods are that in certain types of deformity the execution is extremely difficult and often impossible. They do not constitute an absolute safeguard against slipping of the fragments.

4. The method described, which combines a simple transverse osteotomy with a subsequent molding of the callus to secure correction of the deformity, has been found by us to be very simple and entirely satisfactory.

CASE 1. W. H., a male age 14, was admitted to the Shriners Hospital for Crippled Children May 23, 1924, complaining of stiffness and deformity of the left hip. In September, 1922, the patient jumped from a rafter and that evening he complained of pain in the left hip. Three days later he was confined to bed with high fever and the left hip began to swell. He was taken to a hospital where a diagnosis of tuberculosis of the left hip was made and weight and pulley traction was applied. During the next 6 weeks the pain continued and the swelling increased until the left hip was twice the size of the normal one. From this time on the swelling gradually decreased. The traction was removed at the end of the tenth week and the hip

gradually drew upward. In March, 1923, he was discharged from the hospital. The hip remained swollen and deformed. At the present time there is no pain but the patient's gait is very awkward because of the deformity.

Physical examination. The patient is a well-nourished boy. The general examination is essentially negative. The left hip is held in a position of extreme abduction, flexion and external rotation. There is a marked thickening of the soft tissues in the groin, anterior surface of the upper thigh and over the crest of the ilium. The entire left thigh is much larger than the right. There is no motion of the hip in any direction. In walking the pelvis is tilted downward on the affected side with a compensatory curvature of the lumbar spine. The gait is very slow and awkward (Fig. 3).

Roentgen ray examination May 23, 1924, showed a deformity of 90 degrees abduction and there is solid bony ankylosis. The diagnosis was old osteomyelitis of the head and neck of the femur with involvement of the joint and bony ankylosis (Fig. 4).

Operation May 29, 1924, an incision was made on the anterior aspect of the thigh in the manner described above. Considerable difficulty was experienced in exposing the femur because of the mass of scar tissue encountered. The bleeding from the scar tissue was profuse. A transverse osteotomy of the femur was done and because of the possibility of lighting up the old infection the wound was packed open with gauze saturated with acriflavine. Counter drainage was established by a stab wound in the buttock. A Thomas splint was applied and immobilization secured by pillows and sand bags.

it, its inherent good or must go over to it be absorbed in it be lost in a mere trade and that a degraded and degrading one In the tricks of the charlatan there is nothing new finding medical idols with feet of clay is nothing strange The threatening feature of the day is the widespredding of a spirit in the air, that would infect the medical world with the germs of an all grasping greed and uncontrolled ambition that makes the highest good of medicine the acquisition of money and the praise of the people Do not mistake The duty of each one of us today is as it has ever been to work in this our vocation and art truly rightly and without deceit so that it may be to the glory of God to the common weal and our further knowledge and finally to the health and safeguard of the people Freely you have received as freely give'

DUDLEY WHITE PALMER



Fig 17

Fig 17 Case 4 Roentgenogram showing fusion of head of the femur and acetabulum



Fig 18

Fig 18 Case 4 Roentgenogram after osteotomy of the femur and gradual molding of the callus

sis was tuberculosis and probably incomplete ankylosis (Fig 12)

At operation September 19 1924 through a posterolateral incision a cuneiform osteotomy was done for at the outset it was decided to try to correct the deformity in this manner The marked contracture of the soft parts prevented this correction so the leg was immobilized by means of traction on a Thomas splint

September 28 1924 the day after operation the patient had a high fever which continued for a week after which the temperature gradually returned to normal This was probably due to a tubercular reaction from the old tuberculous joint as the wound healed by first intention

October 10 1924 a gradual correction of the deformity was begun and final position of correction was secured in about 3 weeks

Roentgen ray examination October 22 1924 showed some displacement of the fragments (Fig 13) This was possibly due to inadequate immobilization of the limb while waiting for callus to form In the deformity of flexion and adduction it would seem best to fix the limb postoperatively in a plaster of Paris spica Roentgen ray examination November 21 1924 showed correction of the deformity and consolidation of the callus The patient remained in bed until December 10 1924 when a plaster of Paris spica was applied She was then allowed to walk

January 9 1925 the patient was discharged wearing a plaster of Paris spica

March 18 1925 she returned walking quite well the spica was removed The position of the hip was satisfactory except that there seemed to be a slight increase of flexion (Fig 14)

Roentgen ray examination March 18 1925 showed complete correction of the deformity with union of the fragments (Fig 15) A new spica was applied and the patient was to return in 3 months In all probability the hip joint was not solidly ankylosed and fixation should have been continued for a year or more

July 22 1925 the patient returned for examination She walked very well and there was no pain at any time No motion could be detected and there was no sensitivity The functional result is excellent

CASE 4 J W a male age 16 was admitted to the Shriners Hospital for Crippled Children October 14 1924 complaining of stiffness and deformity of the left hip At the age of 6 years the patient had pain in the left hip which necessitated treatment in a hospital Traction was applied and this was followed by fixation in a plaster of Paris spica No further history could be obtained as patient lived in a Masonic Home and his parents were dead At examination he walked with a very marked limp because of the deformity of the left hip

Physical examination The patient is a very well developed and nourished boy In standing there is a very marked lumbar lordosis with 90 degrees of flexion of the left hip and about 35 degrees of abduction (Fig 19) There is no motion of the joint in any direction and no pain is elicited on a forcible attempt to move the joint

Roentgen ray examination (Fig 17) showed fusion of the head of the femur and acetabulum

At operation October 20 1924 through an anterior incision a subtrochanteric osteotomy was done in the usual manner A Thomas splint and traction was applied holding the leg in the position of deformity The lower end of the

TRACTION ON THE STERNUM IN THE TREATMENT OF MULTIPLE FRACTURED RIBS¹BY T. BARNFORD JONES, M.D., ROCHESTER, NEW YORK,
AND

E. P. RICHARDSON, M.D., BOSTON, MASSACHUSETTS

THE benefit obtained by skeletal traction on the sternum in a case of multiple fracture of the ribs causing marked interference with respiratory exchange seems to warrant a brief report in the hope that the principle utilized may prove of value although the type of injury in which treatment by this method might come into consideration is most unusual. Doubtless the procedure here employed or some modification of it has been used by others but descriptions of such cases are not frequent in medical literature. The indications for its application can best be studied by a consideration of the case in question.

CASE. History No. 261248. J. G., a female aged 37, was admitted to the hospital at 3 p.m. July 17, 1924. The patient had been run over by an automobile shortly before entrance the machine having been seen to pass over the left side of the chest. The patient, a normally developed white child, was in profound shock at the time of admission. The blood pressure was 75/30, pulse barely perceptible, rate 140-150. The skin was of an ashy gray appearance, clammy. There was extreme cyanosis, the mucous membrane and finger tips being almost purple. Respirations were very rapid, rate 50-60 per minute and laborious. With each inspiration requiring great muscular effort on the part of the patient, the sternum and anterior part of the left chest retracted to an extreme degree so that it was obvious at a glance that there were several fractured ribs. On examination it was found that the second to the eighth ribs inclusive were fractured at points corresponding to the nipple line. Laterally the broken ends of the ribs could be seen protruding under the skin about 2 centimeters above the level of the medial ends. In the left axilla there was a localized area of subcutaneous emphysema. There was no evidence of fluid in the chest or in the pericardial sac. The heart was not displaced and was negative on auscultation. The abdomen was held rigid although there was no especial tenderness, spasm or fluid demonstrable in short no definite evidence of intra-abdominal injury. The urine was negative.

Treatment. The usual first aid treatment for shock was instituted immediately. In addition it being obvious that the patient was likewise suffering from a severe degree of anoxemia oxygen was administered. The effect of the latter was very satisfactory, a few inhalations serving to clear up the cyanosis while respiration became much easier. However immediately upon cessation of oxygen administration the patient's condition became alarming so that it was necessary to give oxygen inhalation intermittently. It was quite apparent that the cyanosis and rapid labored breathing were due to deficient ventilation, a resulting decrease in capacity of the thoracic wall. Lachrymatory effort caused a depression of the partially mobilized flexible sternum on the attached ribs rather than an entrance of air into the lungs. While it was possible for the moment to

combat the anoxemia by the use of oxygen it was feared that further encroachment on the vital capacity as a result of hemorrhage or reaction of the lung to trauma might be fatal particularly in view of the profound shock. It was also obvious that if the sternum could be fixed so that retraction did not take place respiration would be easier. Accordingly traction was applied to the sternum in the following manner.

Technique. Under procain anesthesia two small incisions about 1 centimeter long were made just lateral to and at right angles to the border of the sternum at the level of the third interspace and were carried down until the edges of the sternum were exposed great care being taken to avoid puncture of the pleura. An ordinary bullet forceps such as is used to grasp the cervix in gynecological cases was used to grasp the sternum, a hook being placed in the lateral aspect of the sternum on each side and the forceps then being locked. It was found that a moderate degree of traction served to keep the sternum elevated during inspiration. The optimum degree was determined by hand and maintained by the usual method of weights and pulleys attached to a rainbow frame.

Results. On application of traction between 4 and 5 p.m. the respiration which had been between 50 and 60 without the use of oxygen dropped to 40 and was much easier, the patient complaining of no discomfort from the pull on the sternum. Further administration of oxygen was not necessary. The respiratory rate remained between 35 and 40 until late in the evening at which time it rose to 45 only to drop again to 35 within a few hours. The blood pressure rose steadily. On July 17 the day following the patient's admission the patient's condition was much improved. She rested quite comfortably all day. The pulse rate was still rapid at 140 but had improved in quality, the blood pressure being 120-50. The patient's color was much better although there was still slight cyanosis. Respiration was much easier and the rate had dropped to an average of 35. The traction forceps slipped from the sternum during the morning with the result that the pull was being exerted on the skin and fascia of the chest wall. Inasmuch as the traction thus obtained seemed adequate no attempt was made to reapply it to the sternum. July 18, the second day after admission, the patient showed further improvement. The general appearance was much better, cyanosis being practically absent. The pulse was still rapid, the rate 130 but of good quality. Her respirations were 30 but quite normal in character. The patient appeared comfortable and did not complain of the traction which was temporarily discontinued to note the effect on respiration. As its omission did not seem to influence the breathing it was removed. The respiratory rate remained unchanged. However there was again marked deformity of the chest with retraction of the sternum on inspiration.

The remainder of the patient's convalescence was uneventful. Attempts to modify the deformity by adhesive traction or by swatches were unsuccessful. She improved steadily and was discharged on August 7 at which time she was capable of ordinary activities requiring no great

possibility of pneumothorax. The principle employed however is believed to be sound, although crushing injuries of the thorax needing fixation of the sternum to promote respiratory exchange are likely to be extremely rare.

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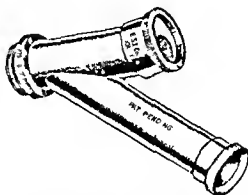
AN OBSERVERSCOPE FOR PROCTOSCOPY¹

By LOUIS A. BUIE, M.D., ROCHESTER, MINNESOTA

Specialist in Proctology

In no field is the physician less satisfactorily prepared than in that of rectal diseases. An astonishing percentage of physicians have never seen a normal rectum. There are several reasons for this: (1) the inherent antipathy of both patient and physician to any consideration of a rectal disorder; (2) the idea that the examination is disagreeable; and (3) the shrinking of patients from being clinical subjects and many such so-called obstacles.

We have had great difficulty in the past in demonstrating lesions within the rectum and sigmoid. When one locates a lesion and looks away long enough to permit a second person to see it is difficult not only to give an accurate description but to keep the proctoscope directed accurately. A deep breath, a cough or the slightest movement of the proctoscope carries the object out of the field of vision. It is believed therefore that in perfecting this observerscope (Figure 1) a need has been fulfilled. The device² which consists of two eye pieces permits two persons to view the same area in the rectum at the



The observerscope consisting of two eye pieces to be attached to a proctoscope which enables two persons to inspect the same field in the rectum at the same time.

same time so there is no danger that the field of vision will be different for the two observers. The instrument is recommended chiefly to physicians who are engaged in teaching proctology and to those engaged in general work. It can be made to fit the inflating attachment of any proctoscope.

¹The instrument may be obtained from the Electrical Surgical Instrument Company, Rochester, New York.

As the situation is at the present time no single man or group of men has the opportunity of seeing and studying a sufficiently large number of cases under the most favorable circumstances for intensive investigation. The observation of a large number of one class of cases stimulates thought and interest and research in such a way as to promote better methods of treatment.

In some of our large hospitals arrangements have been perfected whereby patients suffering with a given pathological condition have been segregated and grouped under one surgical chief and it may be pointed out that with this plan in operation the progress in the better understanding of all phases of that particular affliction has been most satisfactory.

The factors which influence this advancement in knowledge are obvious. If we remember the lessons learned in the war it is true but true that the surgeons actively engaged in the care of the wounded improved their methods and became more efficient when the cases of a given injury were segregated and centralized. This afforded an opportunity to appoint the experienced the specialized and the best equipped surgeon to care for a particular class of cases.

The British and French Medical Corps evolved a system for the centralization of fractures during the year 1917 and from that time the improvement in their end results was most gratifying.

A survey of the situation in that branch of surgery known as industrial surgery in America would indicate that the circumstances surrounding the care of a large proportion of injured patients are influenced by the business methods of the insurance companies carrying the financial risks of the various corporations and building contractors. Some of these companies in their endeavor to minimize the financial outlay have employed the

younger and less experienced surgeons and there has been little or no concerted effort made to improve the methods in the care and treatment of the injured.

Surgeons must come to feel keenly their responsibility in this department of the surgical art. It needs no wordy brief of profound argument to justify the conclusion that the present methods of caring for the injured are a great economic waste when the increased number of days of immediate disability and the more or less permanent disability that may occur is considered.

It would appear that the surgeons of America must be made to feel it their unalterable duty to study the problem from all its angles and in the broadest perspective and to devise some ethical and practical working plan to improve the present situation. True much has already been accomplished and yet the efforts of the few have not been crowned with unqualified success.

A campaign of education must be inaugurated which will stimulate a broad interest in this all important subject which seems to have attracted surprisingly small attention as compared with the thought discussion and teaching devoted to elective surgery.

Such propaganda for enlightenment must originate in the larger surgical societies throughout the country and must be made broad enough to reach the industrial insurance companies. The logic must be such as to appeal to their sense of the economic advantage that must necessarily accrue to them in the better care of the injured patient and in consequence the lessening of the number of days of disability.

It may be pointed out in this connection that the large Labor Organizations are cognizant of the necessity for improvement in the care of the men injured in industrial pursuits and in some States have considered the ad

WE want to give Fulkerson credit for the idea of writing a book on gynecological urology the first I believe in American literature.¹ The interrelationship of genital and urinary tracts is so intimate and reciprocal influence of pathological conditions in the two systems are so frequent that a special treatise on this subject would be decidedly welcome. In such a book one would naturally expect to read something of the author's views on the importance of cystoscopy in determining the operability of cervical cancer on the therapy of vesical irritation following uterine radium treatment on the serious effect of pyelitis on the outcome of gynecological or obstetrical operations on modern views regarding the etiology of pyelitis in pregnancy and the prevention of recurrences on the evolution of surgical treatment of incontinence of the bladder from Kelly's urethrorrhaphy to the pyramidalis operation of Stoeckel on the ureter in prolapse of the uterus. But of all these and other special problems which concern the gynecologist in the study and treatment of urinary affections not a word is said in Fulkerson's book. Instead we read perhaps in amplified fashion what is usually found in books on male genital urinary diseases and a good deal about nephrotomies and pyelotomies nephrectomies and cystectomies and other procedures which are plainly outside our scope and equally plainly belong to the domain of the specialist in urology. The bibliography is largely limited to contributions in domestic journals of the last 3 or 4 years. Yet gynecological urology as a subdivision of gynecology is more than 20 years of age and if the author had not almost altogether excluded foreign references he might have found valuable material to incorporate in his book.

In its present form the book represents urology in women rather than gynecological urology which means something entirely different. Yet the original idea is much too good to be abandoned and we hope that the author by a thorough revision will make his book more serviceable to gynecologists and all those who treat urinary affections in women.

BY diseases of ovulation Dalchic² understands all the phenomena which result from disturbances in the evolution of the egg cell from its primordial state to its maturity and of the follicle from its first appearance to its rupture. Our anatomical knowledge of the conditions involved is very meager hardly that experimental parthenogenesis the effect of X rays and radium on animal and human ovaries and observations made on the offspring of radiated mothers permit us to assume the action of chemical physical and mechanical irritations. For the most part the causes of the diseases of ovulation must be sought in heredity or early infancy. Thus tuberculosis syphilis alcoholism lead poison

ing advanced age of the parents acute infectious diseases fatigue and undernourishment of the child may account for a weakening of the ovaries. Clinically this debility of the ovaries manifests itself in various definite syndromes which are grouped under the heads of infecundity amenorrhoea and dysmenorrhoea and receive detailed consideration in separate chapters. Yet another clinical entity is that of menstrual ovaritis to which the closing chapter of the monograph is devoted. The author finds it somewhat difficult to suggest a precise definition of this form and proposes to call it an ovaritis due to defective ovulation an *arte origene*. Considering the fact that ovaritis implies an inflammatory process it seems to me that we may accept this definition only for want of a better word provided we bear in mind that non-infectious causes and even accidental factors such as traumatism emotional shock chilling etc. may produce the condition in question. The symptoms complications prognosis diagnosis and treatment are fully discussed in each chapter.

What Dalchic says is always well worth hearing. In his latest publication he has given us a *debut* written exceedingly interesting and important chapter of medical gynecology which distinctly merits serious consideration.

Till systematic campaign against cancer which was initiated by the gynecologist Walter in Germany and spread over a large part of the civilized world has led in this country to the formation of the American Society for the Control of Cancer and to the founding of special hospitals for the study and treatment of cancer such as the Barnard Free Skin and Cancer Hospital in St. Louis the Memorial Hospital in New York and the Huntington Memorial in Boston. And now a colleague in far away Brazil has taken up the work in his country. Von Jardim³ of Rio de Janeiro endeavors by his monograph of 243 pages to arouse the interest of the profession in early diagnosis and prophylaxis of cancer. This disease is steadily increasing in Brazil though it is not as common as in other countries. The relative paucity disproves incidentally the claim of Bulkley that the abuse of coffee is one of the causes of cancer for among Brazilians the use of coffee is a vice rather than a mere habit. Parenthetically I would add that the yearly increase is as in other countries probably due to improved diagnosis. After giving a brief historical sketch of our knowledge and the numerous theories concerning the nature of cancer the author proceeds to a detailed exposition of the ways and means adopted in various countries to stem the progress of the disease. We learn from this chapter that in Brazil attempts in this direction date back to 1904 but that they have remained sporadic. Recently however several radical institutions have been founded or are in

crowd still higher the steadily mounting curve which marked the incidence of cures

While artificial pneumothorax is a therapeutic agent of great value yet there remains about 20 per cent of the cases in which it is indicated but cannot be used. These are cases of advanced unilateral pulmonary tuberculosis in which synchæa between the visceral and parietal pleuræ hold the lung expanded and prevent its collapse by air under pressure, cases which because of failure of this procedure are doomed to swell the mortality tables which show that approximately two thirds of these cases die early whereas of those which have been successfully collapsed 66 per cent recover

When there is failure of collapse after repeated attempts at artificial pneumothorax, then only should the formidable operation of extrapleural thoracoplasty be considered. This operation is indicated only in the advanced cases of unilateral pulmonary tuberculosis where the other lung is healthy slightly involved or exhibits healed tuberculosis. This operation as it was finally standardized by Brauer, Fredenich and Sauerbruch, and performed today consists of a long sickle shaped paravertebral incision, beginning at the root of the neck, parallels the spine above and swings out over the tenth rib below, subperiosteally from 2 to 15 centimeters of all the ribs except the twelfth are removed. The evolution of the operation showed better collapse of the lung was obtained when the ribs were resected close to the spine behind for the more mobile costal margins of the anterior

ribs readily collapse with the collapse of the lung. This operation, although done in one stage by many European surgeons, has a lower mortality when done in two stages

An interval of but 2 or 3 weeks between the two stages is dictated because of the rapid reformation of new ribs from the periosteum which has been conserved. These newly formed ribs tend to hold out the collapsed lung and defeat the object of the operation. This operation can be done entirely under local anesthesia but by preference should be done under local anesthesia supplemented by gas oxygen analgesia

By its very magnitude and from the fact that it is performed upon people who are already ill and depleted by the ravages of their disease, this operation must of necessity carry heavy primary mortality within the first month. In the hands of all operators this mortality is approximately from 10 to 15 per cent yet when we stop to consider that almost all of these people are doomed without surgical relief, we believe the hazard of this mortality must be accepted. No case should be subjected to extrapleural thoracoplasty until it has been under the extended observation of an experienced medical specialist in tuberculosis

Studying reports of 1,024 operations Alexander found that there were 32 per cent of cures and 26 per cent of marked improvement shown. Considering that these people cannot recover without surgery, this is ample argument for the operation of extrapleural thoracoplasty

A. A. LAW

AMERICAN COLLEGE OF SURGEONS

THE WIDENING RANGE OF MEDICINE¹

BY THE RIGHT HON LORD DAWSON OF PRESTON GCV O KCMG MD LONDON ENGLAND

A DOUBLE honor is my portion tonight—your fellowship and the delivery of this address and let me say how deeply I treasure it. If my expression of gratitude is brief it is out of regard for the many other claims on your attention this evening not forgetting the expectations for tomorrow which possess the minds of all citizens of Philadelphia. I will ask you then to liken my appreciation to the small hand of the clock which though ranging one twelfth of the distance of the long hand signifies twelve times as much.

We have just witnessed a short but moving ceremony the conferring of the Legion of Honour by Dr de Martel upon Dr Charles Mayo. The honor and the services of the recipient are alike unique in distinction. To all of our tongue in whatever land they be this recognition not only of a great mind but of a genius for friendship will bring rejoicing.

In the choice of a subject suitable to this occasion I was influenced by the knowledge that laymen both interested and distinguished would constitute a portion of the audience so it occurred to me to present for your consideration how on the one hand medicine is increasing its contact with the sciences and on the other hand is extending the range of its influence to cognate activities in the body politic.

Medicine has so to speak an outer and an inner temple. In the inner temple searching and thought reign and in the outer action becomes the handmaid of thought.

During the twentieth century progress in sciences has been so notable that medicine has received fresh direction and inspiration. Thought is vivid new pathways are opening out and the time is instinct with new unfoldings.

And yet we should not forget the debt we owe to the times which have preceded us. It has often been that we have reaped because they have sown and their achievements measure large when the slenderness of their resources is remembered.

And since the spirit of science awoke from its long sleep in the sixteenth century it has been

the proud part of medicine to foster and advance the sciences on which it now increasingly rests.

The dawn was first felt at Padua where Vesalius Fallopius and others of world renown established human anatomy and where Harvey received a measure of that inspiration which gave life to physiology. Let me commend to those who have not yet undertaken it a visit to this ancient seat of learning. Those of us gathered as we were from all countries who met there to celebrate the seven hundredth anniversary of its founding have a treasured memory of an historic pilgrimage to do honor to greatness.

To the early knowledge of physics the medical profession made notable contribution. Gilbert in the sixteenth century Galvani and Young in the seventeenth century stand forth as great discoverers in magnetism electricity and light respectively. They were all three physicians. The identity of the early progress of chemistry with the medical profession was even more close and with biology are associated names such as John Hunter and Richard Owen. Of the total 115 original Fellows of the Royal Society founded in the reign of Charles II 25 were Doctors of Medicine.

It is curious to reflect that side by side with these rich contributions to knowledge by doctors the general practice of medicine was until the nineteenth century befogged by fanciful reasoning and fantastic treatment. It could not shake itself free from habits of thought which had their origin far back in primitive beliefs in magic and hostile deities. And in present times so persistent is tradition the world is still imbued with belief in not in magic yet in the magical to the detriment of its true interests.

To quote Garrod in his eloquent Harveian oration. The primitive medicine and the art of the medicine man survive to this day among the savage races of the earth and he would be a bold man who should deny their survival among those races which regard themselves as the highest products of civilization. Are any of us wholly free from such ideas?

¹Fellowship Address delivered at the Thirtieth Convocation of the American College of Surgeons Philadelphia October 30 1915



PHINEAS S CONNER

1839-1909

soil looms as large as specificity of the infective agent

From another point of view this concern of medicine for the individual man—his resistance—his qualities which make for good and for evil—pushes disease back to its beginnings. We thus become concerned with the fascinating though difficult study of trends and tendencies—with the border country between the physiological and the pathological and this leads one to reflect that the limits of the physiological widen with the advance of civilization. And the body like the mind has its inborn trait. Physiological habit corresponds to character. Who is to say where peculiarity ends and fault begins? Advancing age tends to harden peculiarity into fault. Moreover what we view as peculiarity in ourselves we are apt to term fault in other people. Thus determination becomes obstinacy and strong will becomes self will and conviction becomes obsession and the latter suggests that the philosopher will make his convictions merry so that his old age may possess content.

Take essential hypertension—no doubt this is sometimes an acquired condition but equally often it is an inborn a physiological habit an over responsiveness of the vasoconstrictor mechanism which begins as a peculiarity and may end as a fault or disease—commences in the realm of the physiological and ends in that of the pathological. The irritable heart the over responsive abdomen are other examples. Our object should be to take cognizance of habits and trends and so guide their human poses or that his potentialities operate for his good not for his harm.

Here then there is contact between medicine and education—their spheres overlap—their needful aptitudes resemble. The qualities of mind needed in a diagnostician are as essential to the teacher as to the doctor.

And from this I am led to reflect that teaching will become a prescribed duty in the doctor's career.

How can it be otherwise?

If we are to get to the beginning if we are to guide people in the ways of health if the community is to guard the health of its mothers its babies its school children its industrial workers the family doctor must become an educationalist and in part a health administrator. If he does not his rôle will suffer progressive diminution curtailed as it will be on the one hand by the whole time health official and on the other hand by the invading specialist.

That will in my judgment be a disadvantage to the community. The family has need of its

own doctor known and trusted and it is with his guidance its members should get all that is best from specialism and this is the more necessary in a day when specialization begins early in the doctor's career and is apt to become restricted in vision.

The family doctor should remain the foundation of medical service but his outlook function and training need modification to meet changing needs. First must come his care of the sick but beyond that he will have communal and educational duties.

Take for example the value of medicine toward industry the physical fitness of the worker the survey of his environment the gauging of the suitability of body and temperament to the work required the strains connected with specialization and that new large field of research into the problems of industrial fatigue.

In all these things which concern not only the health and happiness but the efficiency of the worker medicine has responsibility.

Few doctors in a community could fulfill the whole range of such demands. I suggest that in the future the doctors of a district will form themselves into a faculty which would place the varieties of knowledge and experience of its members at the service of the community and in its collective capacity exercise a powerful and much needed influence on public life.

Without let us do nothing which would impair the personal touch, the deep and abiding interest which mean so much in the hour of sickness for our rosary needs to be strung with the beads of love as well as with those of thought.

How then are the members of this local faculty to hold high their standard of work? The answer is by the hospital. Every district however rural should have a hospital adapted to its needs. For myself I should like to see the conception of such a hospital widened to that of a health center where curative work clinic wards communal services educational facilities—could find a home—where doctors could improve their minds give of their best and find encouragement and restraint. And in this connection is to be found one of the most beneficent activities of this illustrious College.

This larger view of the district hospital comes with it a wider conception of the art of healing. Dietetics physiotherapy belong as much to education as to healing. With greater knowledge we have come back to simplicity.

The surgeons first found salvation in fire by the discovery of asepsis and the rest find in air and light a romance of healing. Who would have



PHINEAS S CONNER
1839-1909

days of yore. And so it happens that not only do neuroses become more common but physical illness is apt to be overlaid and interthreaded with troubled states of mind. Chivalric values have changed. And the vagaries in the manifestation of disease which so often vex its unraveling are sometimes the result of mind reactions—of personality.

How often do we not find that an illness with a physical basis, which is perhaps amenable best to surgical interference may have a superstructure of functional disturbances due to present or buried mental experiences not only perplexing the patient and doctor but prejudicing recovery. Thus is explained why some operations cure the condition but not the patient.

It is an interesting reflection that while on the one hand the technique of diagnosis is growing in range and reliability on the other hand the problem before it grows in complexity.

She tells us that laboratory technique though essential is not all sufficing; it throws light on the morbid process but not on the reaction of the latter. It leaves individuality untouched unless as is possible variations in biochemical reactions may in the future disclose a correspondence with variations in bodily and mental functions.

I will next refer to the handling of the mind factor in disease. For reasons given the technique of psychoanalysis, suggestion, and hypnotism though in peculiarly skilled hands and in exceptional cases useful are in general medicine seldom necessary or desirable. The mind cannot, like the body, always stand set and formal treatment for the texture and interlacing of the threads of its web are too delicate. Exploratory operations on the mind do not always heal by first intention.

The best treatment often lies in comprehension, diagnosis and by that I mean the unraveling and exposition not only of the nature of the morbid process but the physical and mental states associated with it.

Sort out a patient's symptoms for him. It is not things but the significance of things which matters. Discomforts ignored in health are liable in neurosis to become obtrusive and produce fears. Such may impede the cure of bodily illness or a function may be raised in consciousness or again a conscious experience may be misinterpreted and assume a sinister significance or again exhaustion may lessen control so that an instinctive tendency naturally suppressed rises up and produces conflict.

Such factors must in my judgment contribute increasingly to the make up of illness and demand our recognition. Explain causes, dissolve doubt and side by side with the best physical treatment restore perspective and the path to recovery and contentment opens out.

An important part of therapeutics is a willingness to listen, a perceptive understanding mind and lucid persuasive exposition.

To those who have tonight been received into your Fellowship may I offer my felicitations and good will. A great heritage and an inspiring outlook are theirs—quest of knowledge, the beauty of craft, the privilege of help and healing, the leadership of their communities toward increasing health and contentment. Between nations medicine stands for reason, forbearance and mercy and with the English speaking peoples it is a beacon light showing the way to closer understanding and the unity of an ever deepening friendship.

AMERICAN BOARD OF OTOLARYNGOLOGY

An examination will be held by the American Board of Otolaryngology in Dallas Texas on Monday April 19, 1926 and in San Francisco California

on Tuesday April 27, 1926. Application should be made to the Secretary Dr. H. W. Loeb, 1402 South Grand Boulevard, St. Louis, Missouri.

in 1887 For 24 years he was professor of surgery in the Dartmouth Medical School

It was nearly 15 years before Doctor Conner had a remunerative private practice These were years of character building In the library of his old home in Cincinnati, he surrounded himself with his heroes Vesalius Harvey, Pare, and Sir John Hunter These he studied and their ideas became his thus crystallizing his character

The early opportunities presented to Doctor Conner so broadened his experience and clarified his vision that he was enabled to find the solution of many problems He belonged to a generation of men who of necessity developed keen powers of observation With a history of the case and their highly trained special senses, they accomplished wonders in arriving at a correct opinion He was often heard to say that the X ray machine was beginning to have a bad effect because its "short cut methods" undermined one's ability to observe Probably the essence of his power lay in his ability to concentrate on the vital factors of any problem and to disregard unessential details As a diagnostician he was of the best, and many times showed an intuition that appeared fairly uncanny On one occasion, when talking to him of this faculty he said 'Intuition, sir, is subconscious reasoning based on previous experience'

Next to his family and friends the medical college, medical education and teaching were his greatest interests As a teacher, all agree regarding his unusual ability but one criticism might be made, that he lectured on a plane above the capacity of his students He used the didactic method with little of demonstration to illustrate This method, perhaps was a fault of the times, as the then customary two short school years to an M D degree gave but little opportunity for practical laboratory or bedside work He was most stimulating as a teacher, not only because of his knowledge of his specialty but because in his lectures the students had the advantage of his broad education in all the collateral branches of learning Perhaps his best work as a teacher of surgery was done in the amphitheaters of the old Cincinnati General and Good Samaritan Hospitals

Doctor Conner, in an address at the opening of the New Medical Hall of Jefferson Medical College Philadelphia in 1899 gave his idea of medical teaching as follows

The logical condensed lucid presentation, in lecture form of the summation of the wisdom of the past the science of the present as they have become a part of the accomplished scholar the dextrous experimenter, the experienced practitioner given in language terse lucid graceful if it may be, is far more impressive, far more instructive far more effective than the study of any textbook

From the 'Historical Address' made at the Centennial exercises of the Medical Department of Dartmouth College in 1897 these sentences are taken

But the knowing is only one side, and that the lesser of medicine, there is also

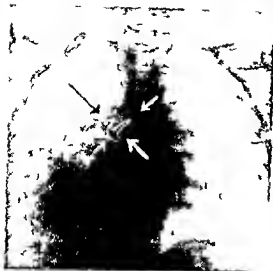


Fig. 1 (Case No. Fbdy. 412) Roentgenogram showing suppurative pneumonia involving the entire right lower lobe caused by occlusion of the stem bronchus by a tack. Duration 3 months. At a rib resection done before admission for a new empyema the pleura was found normal primary union. Then roentgen ray examination had revealed the tack. Recovery after bronchoscopic removal.



Fig. 2 (Case No. Fbdy. 1106) Roentgenogram showing lung abscess of the left lower lobe in a boy aged 17 years due to a dental brace in pirated 1 year and 4 months before the child was brought to the clinic for examination. During an abdominal operation. Complete recovery followed the peroral bronchoscopic removal of the dental brace.

are not uncommon as the result of direct trauma pneumonia influenza infarct and of operations upon the tonsils upper air passages and more remote regions. It cannot be too strongly emphasized that such processes are so exceedingly rare that we may say they do not occur after the inspiration of a foreign body into the bronchi. Bronchiectasis of other than foreign body etiology is when well established a disease that is exceedingly difficult of cure by medical or surgical means and even when these are supplemented by bronchoscopic aspirations curative results are slowly and often only incompletely obtained.

PULMONARY ABSCESS AND DROWNED LUNG DUE TO FOREIGN BODY

We have frequently pointed out (1-3) the anatomical difference between a purulent collection in a section of the bronchial tree due to occlusion of the tributary bronchus on the one hand and an abscess with breaking

down of the bronchial wall and other lung structures on the other hand. Bronchoscopic removal of the foreign body before the abscess formation results in a cure within a few weeks. At a later period a longer time is required for recovery but recovery is almost invariably the ultimate result. It must be remembered however that complete breaking down of the tissues such as is common in post torvic tonic post pneumonia post influenza and tuberculous abscesses with cavitation air content and fluid level has rarely if ever been present in any case of foreign body of short or prolonged sojourn coming to the Bronchoscopic Clinic. The pathological processes seem to be rather those of hyperplasia than of liquefaction of tissue. Whether or not this fully accounts for the difference in the clinical course we are not prepared to say but the clinical fact remains that the 98 per cent of recoveries from suppurative disease of the lung after bronchoscopic removal of a foreign body is unparalleled by any other form of lung suppuration. This statement is based not upon a case or two but upon such a long

can Surgical Association At the close of the Spanish War, President McKinley appointed him to serve on the examining board investigating the conduct of the war, this service necessitated the abandonment for months of his private practice He was a member of the Loyal Legion Sons of the American Revolution and of Colonial Wars The title of LL D was conferred by Dartmouth in 1884

Doctor Conner was married in December 1873, to Julia E Johnston of Cincinnati and his devotion to this woman was ideal Three children were born to them It was a revelation to see him in his home Hard as it may be for his casual acquaintance to believe it, there is ample proof that Doctor Conner loved a joke for the joke's sake and was full of fun and quiet wit He once said about children "What with the plague of their living and the fear of their dying there's no fun in them All day long he would go about his business like a storm cloud but the minute he passed the threshold of his home a smile lighted his face He became apparently the youngest member of the family no longer the ruler but the ruled all this following a day of impetuous driving work when assistants internes nurses, feared him and bowed to him as a strict disciplinarian His love of home and family was intense and to his wife he was the essence of chivalry The death of Mrs Conner in 1899 was the beginning of a break from which he never completely recovered Doctor Conner died just as he wished, suddenly and without warning March 26 1909

A word picture of Doctor Conner cannot be better completed than to quote a few remarks made by him over thirty years ago in one of his valedictory addresses to the students of the old Medical College of Ohio which undoubtedly express the rule of life by which he lived

"Wherever you may go whatever you may do be earnest be honest be faithful and hopeful The life of the physician demands the exercise of the highest qualities of mind and heart If you would live it aright bestudious be thoughtful judicious watchful It carries with it grave responsibilities, it brings with it full rewards There is in it labor and cares and anxieties there comes from it the enduring satisfaction of beneficent work well done It teaches us to be considerate charitable humane It opens to us the brightest and the darkest chapters in a man's history It reveals the heights of human affection, it lays bare the very depths of human depravity There is nothing in life that it does not acquaint us with From now on until the great change comes to each of you it will have no beginning it will have no end Days and nights and times and seasons are as if they were not for the doctor is always on duty In the thick of the fight or waiting orders with the reserves guarding the outpost or leading a forlorn hope he is ever full armed As the occupation is a constant one so must the preparation for it be a constant one Mind and body must be kept in the best possible order Sobriety and studiousness must characterize the life In our own country we now seem to be approaching a point at which a choice of way must be made The commercial spirit of the age is influencing all persons affecting every occupation Medicine must either receive it and direct it, and secure from



Fig. 5 (Case No. Fbdy 1153) The shadow of a dental filling is seen behind the heart shadow. An abscess resulting from the 3 months obstruction of the left bronchus by the dental filling healed promptly after the bronchoscopic removal of the foreign body.



Fig. 6 (Case No. Fbdy 1237) The suppurative area distal to the tick of which the shadow shows in this mentogram disappeared completely without treatment other than the bronchoscopic removal of the tick. The tick had been in the lung for a year and a half.

SUPPURATION DUE TO METALLIC FOREIGN BODIES

The characteristics of this class of cases especially when non obstructive are (a) the long symptomless interval after the lodgment of the foreign body and (b) the mildness of the symptoms when they develop. There is no pain and there is usually little or no cough or fever. Shock, prostration or toxemia are practically never present. The patient is usually unaware of anything abnormal and only too often the medical attendant is misled into giving a negative opinion as to foreign body. This apparently normal condition of the patient immediately after the inspiration of a foreign body may be contrasted with the grave symptoms at the onset of pulmonary suppuration due to septic infarct pneumonia, post tonsillectomic or supposed post anasthetic abscess.

In a recent presentation (c) of cases of overlooked foreign bodies in the lungs I referred to cases in which foreign bodies had been in the lung for periods up to 36 years. A number of such cases have been previously

published (3, 4) and many appear in the complete tabulations (1, 3, 7, 18) of our Clinic. From among these cases we may call attention to the following cases by their serial numbers by which they can be identified in the tables referred to.

Case No. Fbdy 1095. Screw in the lung of a girl aged 10 years for one and a half months (it was 15 months old until it was 3 years old 21 months). The suppuration was continuous after 17 months but the child was not extremely ill. Complete recovery followed bronchoscopic removal.

Case No. Fbdy 986. A shawl pin in the lung of a girl aged 10 years for one and a half months (it was 15 months old until it was 3 years old 21 months). The suppuration was continuous after 17 months but the child was not extremely ill. Complete recovery followed bronchoscopic removal. The child could scarcely be said to recover since there was nothing from which to recover. She was normal before bronchoscopic removal and normal afterward. The foreign body was metallic and it was non obstructive up to the time of removal. We have had over 150 such cases. Later the foreign body would have become obstructive and suppuration would have followed with all its systemic sequelae.

Case No. Fbdy 726. A shawl pin in the lung of a woman aged 41 years for 28 years. Here we had the same kind of a pin as in the foregoing case. It was metallic and was non obstructive for many years during which time there was no suppuration and no symptoms. Eventually however a corrosion of the pin resulted in increasing its bulk and in the production of granulation tissue by the mechanically irritating roughness. The increased bulk and the



Fig 9 (Case No Fbdy 1393) The staple shown was aspirated when the patient was 3 years old and remained in the lung for 15 years. The resultant pulmonary abscess completely healed with treatment other than the bronchoscopic removal of the staple. The foreign body shadow is retouched for clarity in this and some of the other illustrations.

associated with 15 years of lung suppuration was due in our opinion to the germinal action of a corroding metallic foreign body.

Case No Fbdy 1570 Foreign body (a screw) in the lung for over 40 years. A woman aged 47 years visited Dr Frederick W. O'Brien complaining of ill health since childhood. She had always been delicate and subject to attacks of fever with cough and some expectoration. Recently there had been local distress over the right lung but the temperature was elevated only slightly and occasionally. Most of her previous medical attendants had made the diagnosis of chronic bronchitis. Dr O'Brien made a roentgen ray examination which revealed a metallic foreign body of the shape of a wood screw deep in the right lung. After the screw was discovered by the ray the patient recalled having been told by her mother that when she was less than 7 years old her mother had found her screaming and crying locked in a room. When her mother had got into the room the child had said that she had swallowed a screw from a cup. The family physician when consulted said it would pass.

The patient was referred to the Bronchoscopic Clinic for the bronchoscopic removal of the screw.



Fig 10 (Case No Fbdy 1261) The suppuration involving almost the entire left lung was due to the presence of an aspirated safety pin for 4 years. A complete return of the lung to normal followed the bronchoscopic removal of the safety pin.

Dr Elmer H. Funk reported as follows: Patient fairly well nourished, no clubbing of the fingers, heart normal. There is slight wheezing, but no dyspnea nor cyanosis. Expansion is limited over the entire right side. Percussion note is clear anteriorly, high pitched (wooden tympany) posteriorly on the right side. Breath sounds over this region bronchovesicular. A few fine crackles are heard near the apex, medium and fine rales from apex to base with greatest intensity near the angle of the scapula. No evidence of cavity formation.

Röntgen ray examination. Dr Wilfrid F. Manger reported as follows: There is a screw about 13 millimeters in length apparently in the anterior branch of the right lower lobe bronchus in close relation to the mouth of the lower lobe bronchus. There is considerable fibrosis just at the screw and anterior and distal to it. In the lateral view it lies about 2 inch in front of the anterior border of the vertebral body and in the anteroposterior view it lies at the level of the ninth rib just about 1/2 inch to the right of the right border of the vertebral body (Fig. 18). Point is downward and I suspect that because of this drainage has been maintained very much better than if the head had been downward. There evidently has been some corrosion but it is possible to recognize the shadow of the head of a screw. The lung tissue outside of the area of the foreign body is remarkably clear in view of the long duration of the foreign body.

Blood examination by Dr I. C. Lintgen was reported as follows: red blood cell 4,300,000; hemoglobin 70 per cent; white blood cell 7,600; color index .84; polymorphonuclears 60; small mononuclear 34; large mononuclears 0; transitional 4; eosinophilic 2.

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

BY ALFRED J. BROWN M.D. F.A.C.S. OMAHA, NEBRASKA

THE OBSTETRICS BOOKLET OF RUEFF

THE practice of obstetrics in the early part of the sixteenth century had not kept pace with other medical branches and was still in the hands of ignorant midwives and charlatans. Fuchsius Roesslin had done his bit to try to raise its standards with his *Rosegarten* but though the volume passed through many editions little was accomplished. The time was ripe therefore for a new book on obstetrics. This was seized upon at only a few years interval by two men in two countries. The first of these was Jacob Rueff of Zurich, Switzerland who in 1554 published a very cheerful book, let of encouragement of the conception and birth of men and its frequent accidents and hindrances etc. at Zurich and a second edition appeared in 1559. Why the volume should have been called "cheerful" it is hard to understand as it is any thing but that but there the title stands. Ein schon lustig Trost buche etc. An edition printed in Latin appeared the same year 1554 in which the title reads Concerning the conception and generation of man etc. Shortly after the author's death in 1558 the incongruity of the German title was apparently recognized and the book was reprinted at Frankfurt a. Main in 1580 under the title *Midwives Book* from which one I taught all the secrets of the female sex etc. The book remained extant for over a hundred years the last edition being printed at Amsterdam Holland in 1610. The volume I examined is one of the Latin editions printed at Frankfurt in 1587.

When one reviews Rueff's life and his manifold activities one at first wonders why he happened to write a work on obstetrics but looking the book over carefully seems to answer the question. Where he was born is in doubt some authorities say in the Pfalz others in Wuerttemberg. When he was born is unknown as is also the date when he came to Zurich and settled there. He was prominent in many fields. He wrote astronomical notes for an almanac and furnished the tables for blood letting. He was a popular poet and folksong writer. He was also a great enthusiast for religious freedom so much so that he was tried twice (1527, 1531) with the troops of Zurich against the Catholic cantons. He was like wise a dramatic writer and in 1535 his play *Hoob* was produced and in 1545 his *Wilhelm Tell*. He seems also to have been well known in medicine in

Zurich at least for in the almanac he is described as surgeon and lithotomist of Zurich. In addition to his obstetrics he wrote a little book of 59 pages on tumors which was published in Frankfurt in 1556 and republished in Amsterdam in 1648 and 1662.

The book follows the *'Ro egarden'* fairly closely. Additions are made as Rueff advises cephalic in addition to podalic version and describes its performance in detail. He advises and illustrates both toothed and smooth forceps for the extraction of the dead fetus but does not advise their use on the living child though the smooth forceps (see illustration) look as if they could have been used for at least a low forceps delivery. The various types of abnormal positions of the fetus *in utero* (some of them imaginary) are illustrated and serve to show that the author knew the commoner malpositions.

It is in that portion of the book devoted to monsters that it seems to me his desire to write the book crops out. When we remember the man was a religious zealot here was his opportunity to apply this phase of his character to medicine. At this time the theory that the devil worked his will on pregnant women was rife. The great Luther himself believed that the devil substituted changelings for normal children and gave the signs by which they might be recognized. But more than that these changelings and monsters came as the punishment for sin. So Rueff devotes ten pages of his book to their illustration and description. How better could he help to save the people from sin than to give the backing of science to the penalties of religious error? He illustrates first the intra uterine amputations, authentic without doubt. Then double headed and double bodied adults and infants. Siamese twin anomalies, the remains of fetal inclusions such as a head protruding from the abdomen, then club hands, club feet and double hands. So he takes in fairly well the range of possibilities. But then he leaves the possible and goes to the changeling and describes and illustrates instances of infants with claw hands and feet, eyes in the abdomen and extraneous animal heads protruding from the joints, infants with animal heads (even one with an elephant head) and finally as a climax an infant with a horn wings and the sign of the cross surmounted with upslon on its breast. There were also other abnormalities but the interesting point is that to each he gives an interpretation on a religious basis. Was his desire to bring this material forward the reason for his writing the book?

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Fig. 13 (Case No. Fbdy 1383) Needling and rib resection had both been negative for empyema before the roentgenogram was taken. The suppuration due to the prolonged sojourn of the screw healed completely after bronchoscopic removal of the foreign body.

This is in marked contrast to suppuration of other than foreign body origin such as that following lobar pneumonia with its large area of devitalized, often sloughing tissue. In making this comparison and in contrasting this case with cases of long sojourn of penetrating projectiles it must be remembered that this foreign body was not encysted. It was in the bronchus at first surrounded by normal wall later surrounded by a gradually increasing fibrotic barrier built up by granulation tissue. This granulating area was probably at all times in direct communication with the bronchial stem through which the never copious purulent discharge drained and through which air with its potentially infective agents had access. It is evident that there was a highly efficient defense against the spread of septic processes and probably also a germicidal effect ionic or other exerted by the foreign body itself.

BRONCHIECTASIS DUE TO METALLIC FOREIGN BODY

Bronchiectasis indistinguishable by symptoms, general examination or physical signs from that due to other causes has been found in many of our cases of prolonged sojourn of a foreign body in the lung. The clinical course of these cases after removal of the foreign



Fig. 14 (Case No. Fbdy 1394) The area of suppuration in the right lower lobe was due to the presence for a month of the tooth filling whose shadow shows. Complete recovery followed the bronchoscopic removal of the foreign body.

body is in such striking contrast to anything seen in well established bronchiectasis due to other causes as to point to an essential pathological difference but exactly what constitutes the structural differences we have not been able to determine because of the rarity of mortality and consequent dearth of autopsies. The almost incurable nature of well established bronchiectasis due to the usual causes is well known. On the other hand for foreign body bronchiectasis even when very extensive and present for years usually gets well spontaneously after bronchoscopic removal of the foreign body. Many remarkable examples of this are among our case records, many of which have been published (see appended list of references). The citation of one case will suffice here.

Case No. Fbdy 659. Well established bronchiectasis cured by bronchoscopic removal of the causative foreign body. A boy aged 8 years, the son of a physician, had had cough, foul expectoration, clubbing of the fingers and general ill health since an attack of hæmoptysis and supposed pneumonia at about 2 years of age. Diagnoses of post pneumonia

To discuss whether or not all these suggestions are feasible or applicable to our own conditions is beyond the scope of a review. The study of this pamphlet however must be warmly recommended to any sociologically minded physician.

I AM not equally positive about the book by Rout.¹ In fact I was so afraid lest I might not do justice to it that I asked a friend of mine to review it for the readers of this journal. Her comment follows.

The Morality of Birth Control is an enthusiastic and feminine revelation of this perplexing question. In thirteen chapters and an appendix Mrs Rout presents the subject hygienically and at times somewhat hysterically inasmuch as she establishes for her thesis the hypothesis that mankind's capacity for improvement is at present locked up in the bodies of womankind. The means for its release is the natural constructive chastity of enlightened free and independent womanhood. Toward that goal the first step is the education of young unmarried women as to the physical basis of marriage and the meaning of marriage for the existence and evolution of the race; the second step is the education of young wives to the control of their own fertility so that there may be no unwelcome maternity. Then and not till then the evolution of man will be resumed. The individual happiness of romantic lovers will not be interfered with. At present women are not the mothers of the race; they are each individually the private property of some individual man. Once they are released from this bondage made socially and economically free their natural chastity will make them faithful to the men they love. Virtue will be enthroned and the race will evolve. All this however with the universal use of contraceptives.²

It is very evident from the above that Mrs Rout's experience as a law court reporter and social worker has somewhat prejudiced her judgment as a married woman which she now is. Consequently throughout her book she is polemical rather than practical sentimental rather than scientific. However she is always amusing and interesting. Her humor is prolific. For instance she says: Total abstinence from sexual intercourse may be said to be the only absolutely certain 100 per cent fool proof form of birth control. Again Abstinence has no more and no less value in the cultivation of sound ethics than starvation has in the cultivation of sound digestion.

Birth control is no a modern invention. Mrs Rout says it is thousands of years old older than the Bible in which control must have been employed because we find frequent exhortations to increase and multiply. She insinuates that both the state and the church unconsciously practice birth control the state in its regulatory laws for marriage and divorce the church in its definition and insistence

upon chastity and its imposition of celibacy upon millions of nuns and priests. War and society practice it in many ways but specially in condemning the surplus women to perpetual virginity. Mrs Rout traces the gradual rise of sex ethics through the evolution of our domestic departments such as the cave harem and home. She shows how social ethics have graduated from infanticide and feticide to prevention by means of contraceptives. However race improvement is a positive not a negative process. It is not enough to destroy or prevent the birth of the unfit but it is necessary to produce the fit through selection or eugenics and the careful spacing of births. And finally Mrs Rout establishes the hope of the future of the race upon the natural chastity and monogamous instinct of women.

Being a woman myself I must confess that I am both startled and flattered by Mrs Rout's naive and original book which I recommend as entertainment to the wise and propaganda to the unenlightened!

PUBIOTOMY and symphyseotomy are much more in vogue in France than in most other countries. These operations formed the official subject for discussion at this year's meeting of the French Gynecological Society and the transactions indicate that their popularity remains undiminished. The cervical cesarean section which has supplanted these operations in Germany and is gaining ground both in this country and in England has not found much favor in France. Another rival however has risen in the form of the exteriorization operation of Portes of Paris. The steps of this novel and interesting procedure are briefly as follows. The pregnant uterus is lifted out of the abdominal wound and the latter is quickly closed behind it. The uterus is then incised, the child extracted and the uterine incision sutured. The uterus remains outside of the abdomen for several weeks protected of course by suitable dressings until involution is complete when the abdominal wound is again opened and the uterus restored into the pelvic cavity. In a recent inaugural thesis Scemla³ endeavors a comparison between the Portes operation and the operative enlargement of the bony pelvis. He enumerates the indications for the two methods of delivery describes their technique illustrates his contentions with case reports and finally draws a parallel between these procedures. Inasmuch as pelyotomies date back 30 years and the exteriorization operation is barely two years of age and numbers only seventeen observations such a comparison strikes me as somewhat premature. As it is the author arrives at the conclusion that in cases of contracted pelvis with or without infection pelyotomy is distinctly superior to the operation devised by Portes.

¹ INDICATIONS RESPECTIVES DES PELVITOMIES ET DE LA CÉSARÉENNE SUIVIE D'EXTÉRIORISATION TEMPORAIRE D'UTÉRUS. By Docteur Jules Scemla. Paris Octave Doin, 9 5.

² T. S. McNALLY C. BIRTH CONTROL. By Ethel A. Rout. London J. S. Lane the Bodley 11. Limited, 9 5.

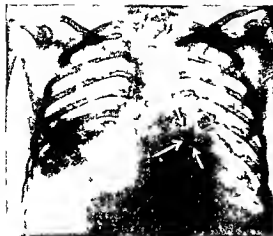


Fig 13 (Case No Fbdy 1383) Needling and rib resection had both been negative for empyema before the roentgenogram was taken. The suppuration due to the prolonged sojourn of the screw healed completely after bronchoscopic removal of the foreign body.

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Case No Fbdy 650 Well established bronchiectasis cured by bronchoscopic removal of the causative foreign body. A boy aged 8 years the son of a physician had had cough foul expectoration clubbing of the fingers and general ill health since an attack of hæmoptysis and supposed pneumonia at about 2 years of age. Diagnoses of post pneumonic

process of construction and a slowly accumulating medical literature bears testimony to the fact that the importance of the subject is permeating wider circles. A separate chapter is devoted to cancer of the uterus in particular. The section on pathology which is very well presented would have been improved by a few well chosen pictures but there are no illustrations whatever in the monograph except a reproduction on the title page of the cancer of Ambrose Pare, the crab with claws and long legs. As to treatment the value of surgery is dwelt upon rather briefly radiotherapy is emphasized though it is still too new to permit of definite conclusions as to its efficacy. More emphasis than with us is laid on organotherapy serum and vaccine treatment and hypodermic and internal administration of various metal and biological preparations. It seems to me that in this particular section the author has left the path of actual experience and lost himself in the maze of speculative and unproved remedies. He might have rendered a better service to his compatriots by calling to their attention definitely tested methods of treatment of inoperable cancer of the uterus such for instance as the acetone treatment which now has stood the test of 20 years. The closing chapter contains thoughtful and detailed plans for a national Institute of Cancer and an outline of a nation wide campaign.

We welcome in Monjardino's treatise a new ally in the fight against a relentless foe.

THE fifth edition of Jellett's book¹ has been enlarged by the insertion of sections on tubal insufflation and pneumoperitoneum Sampson's endometrial implants and ovarian transplantation and other new subjects. Even with the additional 100 pages the work holds a happy medium between the all too abbreviated manuals and the bulky tomes of some recent textbook writers. Its makeup is distinctly pleasing paper and type are of the best and the illustrations are numerous and well executed among them there is an unusually large number of colored pictures and plates. The author who now lives in New Zealand has successfully overcome the difficulties imposed by the great distance which separates him from his publishers in London. There can be no doubt as to the author's ability as a teacher. His insistence on pathology both gross and microscopic and the lucidity of his descriptions prove it and I was glad to acknowledge it in a previous review.²

At that time I took occasion to mention a few shortcomings and omissions which slightly interfered with the full enjoyment of the reader but these have not been corrected in the present edition. The chapter on vaccine treatment in both editions has been contributed by Dr Rowlette and a comparison of the two brings out the interesting fact that this author has found no reason to change his

views in the past 9 years. Gonococcus vaccine has continued to yield remarkable results in his hands. In gonorrhoea of the vagina and uterus complete cure seems to be the rule though the treatment may consume considerable time. In ascending gonorrhoea of the tubes vaccine if given in time may prevent salpingitis developing into pyosalpinx and thus prevent sterility. Since the vaccine therapy has been disappointing to the great majority of writers the continued success in Rowlette's experience must attract our attention.

A GOOD Spanish textbook of obstetrics looks amazingly much like any American or German textbook as to shape and size arrangement of the subject matter and illustrations. Such at least is the case with the textbook by Recasens³ which recently appeared in its fifth edition. I have looked through the work largely with a view of discovering wherein Spanish thought and practice in obstetrics differed from ours but I find extremely little to report. This is after all not surprising for Recasens is the recognized leader of our specialty in Spain and the numerous references in the text and the extensive bibliographies at the end of each chapter show that he has kept in closest touch with all developments both in his country and abroad.

It may interest American readers to learn that manarche occurs in Southern Spain at 13 years and but one year later in the rest of the peninsula. Recasens prefers the dorsal posture for delivery in contrast to English obstetricians who rather favor the lateral position. Chloroform which he administers by a mask of his own construction is the anæsthetic of choice in labor. Lateral episiotomy is preferable to median incision. Conservatism should prevail in the therapy of eclampsia an abdominal cesarean section add another heavy burden to the exhaustion of the organism. Digital pelvimetry of the diagonal conjugate is depicted as being made with the index finger alone. I doubt whether it is possible to reach the promontory in a normally large pelvis with only one finger. Radiopelvimetry is resorted to rather frequently and instructions are given as to how to obtain reliable results. A number of excellent X-ray plates both from his own material and from the well known work of Warnke⁴ indicate that the author values X-ray photography. In marginal and lateral placenta prævia rupture of the membranes version the Champetier bag tamponade etc. are indicated. The maternal mortality ranges between 6 and 10 per cent that of the children between 40 and 60 per cent. Cesarean section is permissible only in the case of central placenta prævia if the child is alive.

If we cast a final glance upon the books reviewed in this issue and make note of their birthplaces—Austria Germany England France United States Brazil New Zealand Spain—we must needs be impressed anew with the wide extent of our scientific fatherland. Such is the world.

¹ J. L. JELLETT, "Gynecology," 5th ed. (1914). London: J. & A. Churchill, 1915.
² *Rev. Gynec. & Obst.*, 1917, 22, 713.

³ R. DO. O. RECASENS, "Obstetrics," 5th ed. Barcelona: J. J. 1915.
⁴ *Obst. & Gynecology*, 2d ed. Barcelona: J. J. 1915.



Fig 18 (Case No. 1520) Roentgenogram showing a suppurative area in the right lower lobe due to the presence of a screw for a period of 40 years in a woman aged 47 years. The small amount of pathology present points to the existence of a former abscess, suppurative infection by the endobronchial route and also to a germicidal action of metallic foreign bodies in the bronchi.



Fig 19 (Case No. 1558) A roentgenogram of a woman aged 49 years showing the pathology in the right lung due to the presence of a portion of a safety pin for a period of 15 years. The limited amount of pathology points strongly to the existence of a barrier structural or physiological against infective invasion of the lung by the endobronchial route and also to the existence of an antiseptic action resulting from ionization or otherwise a society with the presence of metallic foreign bodies in the bronchi.

short sojourn are not germane to our present purpose. Details of the cases will be found in the tabulated and other published reports of the Bronchoscopic Clinic.

Tacks. We have had over 45 cases of tacks. The long duration cases were as follows: In 14 cases the tacks were present from 1 to 7 months. In 7 other cases the tacks were present for the following number of years: $1\frac{1}{2}$, 2, 2 $\frac{1}{2}$, 5, 9, 20. With one exception all patients recovered after bronchoscopic removal of the tack.

Staples. Of 15 cases of staples the foreign body was present from 1 to 5 months in 4 cases, in 3 other cases for 2, 6 and 15 years respectively. In all cases of prolonged sojourn the patient recovered after bronchoscopic removal of the staple.

Screws. Omitting the recent cases, out of 8 cases of screws 4 were in the lung for periods of from 1 to 3 months. In 3 other cases the duration of sojourn was $1\frac{1}{2}$, 2 and 40 years respectively. All patients recovered after bronchoscopic removal of the foreign body.

Pins. Of 60 cases of pins 50 cases were of short sojourn. In 6 cases the pins were present from 1 to 5 months. In 4 cases the sojourn was 7, 18 and 28 years respectively. In all the long sojourn cases the patient recovered. The patient in whose lung the pin was lodged for 18 years was the daughter of a physician. She has married and is in perfect health.

Safety pins. Omitting recent cases, notable long durations were from 1 to 10 months in 8 cases. Longer sojourns were 2, 4, 15 and 36 years. All patients recovered.

Collar buttons. Omitting recent cases, prolonged sojourns were 2 and 8 months and 1, 4, 8 and 6 years. All patients recovered.

Pencil caps and other brass caps. Notable prolonged sojourns were $1\frac{1}{2}$, 2 and 21 years. All patients recovered.

LUNG SUPPURATION DUE TO DENTAL OBJECTS

Teeth and fillings. Omitting 15 recent cases there were sojourns of from 1 to 7 months in

process of construction and a slowly accumulating medical literature bears testimony to the fact that the importance of the subject is permeating wider circles. A separate chapter is devoted to cancer of the uterus in particular. The section on pathology, which a very well presented would have been improved by a few well chosen pictures, but there are no illustrations whatever in the monograph except a reproduction on the title page of the cancer of Ambrose Park, the crab with claws and long leg. As to treatment the value of surgery is dwelt upon rather briefly, radiotherapy is emphasized though it is still too new to permit of definite conclusions as to its efficacy. More emphasis than with us is laid on organotherapy, serum and vaccine treatment, and hypodermic and internal administration of various metal and biological preparations. It seems to me that in this particular section the author has left the path of actual experience and lost himself in the maze of speculative and unproved remedies. He might have rendered a better service to his compatriot by calling to their attention definitely tested methods of treatment of inoperable cancer of the uterus such for instance as the acetone treatment which now has stood the test of 20 years. The closing chapter contains thoughtful and detailed plans for a national Institute of Cancer and an outline of a nation wide campaign.

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If we cast a final glance upon the books reviewed in this issue and make note of their birthplaces—Austria, Germany, England, France, United States, Brazil, New Zealand, Spain—we must need be impressed anew with the wide extent of our scientific fatherland which is the world.

¹ PRACTICE OF GYNECOLOGY. By Henry J. Jellett, M.D. (D. Sc. Univ. Victoria) F.R.C.P. 5th ed. London: J. & A. Churchill, 1925.
² Surg. Gynec. & Obst. 37: 222, 1923.

³ TRATADO DE OBSTETRICIA. By Dr. Serafín Recasens. 5th ed. Barcelona: Salvat, 1925.
⁴ Obstetrics and Gynecology etc. 5th ed. Barcelona: Salvat, 1925.

While in some instances this may have been due to the differences in the kind or relative virulence of the bacteria with which the inspired foreign body was smeared before or during its sojourn in or passage through the mouth it more often seems to have been related to the nature of the substance itself. A few of the many interesting questions in this connection on which we are still working are:

Do vegetal substances break down the barrier against pyogenic invasion?

Is there a germicidal action ionic or other in cases of metallic foreign body undergoing oxidizing corrosive processes in the bronchi?

These and other interesting phases of this subject were considered by the author in the Muetter Lecture and in other publications.

One point in support of the theory of a barrier to bacterial invasion by way of the bronchial mucosa is the very different clinical course run by suppurative processes due to septic emboli as compared to suppurations of foreign body origin. The sudden extreme prostration pallor dyspnea rapid pulse and profoundly toxic condition of the patient and the rapid breaking down of lung tissue associated with embolic suppurations would seem to indicate that the bacteria had got in behind a barrier that seems to have held in check the suppurations secondary to endobronchial foreign body invasion in all except the cases of vegetal foreign bodies such as peanut kernels maize watermelon seeds etc in children. Even in the latter class of cases the removal of the foreign body usually results in such a rapid cure (usually only a few days) as to point strongly to a very efficient defense to invasion by the endobronchial route. The existence of a defensive mechanism against insufflated endobronchial infection efficient against certain organisms inefficient against others has been recently demonstrated on mice in the laboratory by Stillman (17). His findings as to the defensive power of the lung being unable to annihilate certain streptococcal organisms would seem to confirm my opinion that metallic foreign bodies have a germicidal effect. In our hundreds of such cases there must have been many plentifully smeared with streptococci of various kinds and

of various degrees of virulence. Streptococci were found in most of the suppurative foreign body cases.

CONCLUSIONS

1. Pulmonary suppuration starting endobronchially and due to the presence of a foreign body is when contrasted with embolic post-pneumonic and post-influenzal suppurations such a mild slow and restricted process and manifests such a tendency to prompt and complete recovery after removal of the foreign body as to suggest the existence of some sort of physiological or structural barrier against the invasion of suppurative processes by the endobronchial route.

2. The characteristics of foreign body suppuration mentioned in the foregoing paragraph are most marked in cases of metallic foreign bodies which seem to possess germicidal powers. The same characteristics are present in a less degree minus the germicidal powers in other kinds of foreign bodies. They are least apparent in the cases of vegetal foreign bodies but even in these the prompt recovery in almost all cases if the foreign body has not been long in the tracheobronchial tree is in marked contrast to lung suppuration of any etiology other than that of foreign body.

3. Complete recoveries in a long series of cases after foreign body suppuration of from 10 to 36 years duration with no treatment other than the removal of the foreign body is so different from the course of pulmonary suppuration of any other etiology as to call for a separate classification for suppurations due to endobronchial foreign body.

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It is difficult for us to convince the public that we have no wonders to offer except those to be found along the narrow and straight path of rational endeavor and this is especially true in the realm of therapeutics.

We in the profession might set example by a more critical examination of our ways and means. We are apt to forget how many of our remedies and formulæ have descended by apostolic succession from previous generations. In order to illustrate, not what our formulæ are but from what they have descended, let me quote you. An excellent Medicine for the Dropsie made for Queen Elizabeth by Doctor Adrian and Doctor Lacy.

Take Polypodium Spikanard Squat Ginger, Markoram Galungal Setwel of each a penny weight Setna leaves and cods so much as all the rest grossly beaten put them into a bag, and hang it in an earthen pot of two gallons of Ale and every four daies cover the pot with new Barm and drink no other drink for six daies and this shall purge all ill humors out of the body neither will it let the blood putrifie nor flegme to have domination nor Choller to burn nor Melancholly to have exaltation it doth encrease Blood and helpeth all evils it helpeth and purgeth Rheum it defendeth the Stomack, it preserveth the body and engendereth good colour comforts the sight and nourisheth the Mind.

There are features of this prescription which might make it popular today and even in this country.

And yet in that gray light there were glimmers in the sky. For instance digitalis was in the pharmacopœia of 1665. Another example of cycles in knowledge is to be found in the fact that Gardner recommended iodine for goiter 100 years ago. And that is dwarfed when we learn from Professor Schmidt that an herb Ma Huang containing an active principle similar to adrenalin, was sanctioned by the Emperor Shen Nung and used over 5,000 years ago.

Of the science on which medicine is now firmly founded physiology, chemistry, and physics stand forth prominently and their growing territories are widening the range of medicine. Chemistry in particular seems to be acquiring increasing contact with the science of the living body and mind and one wonders now that the mysteries of the atom have been penetrated whether in the future physics may not gather physiology and chemistry unto itself. And perhaps one of the reasons why the honor of your choice has this year fallen upon a physician is the recognition on your part that the progress of surgery will

henceforth depend and in increasing measure on co-operation with medicine. Although technique will continue to improve it will not command the position it has hitherto done. Speaking as a physician who has always been in close association with surgeons I suggest that there is here and there a tendency to overemphasize mechanical aids forgetting that greatness in art is to be found in simplicity. Your thoughts are turning to the study of the tissues and forces of the patient. With you as with the physician, the cry is 'Back to the soil'.

The fear of sepsis no longer possesses the surgeon though it still influences his thought. You now rely on studies it may be of liver or pancreatic function, of sugar, chloride or non-protein nitrogen content, of metabolic rates. These help you to understand the problem of each patient, the peculiarities even the perversities of his symptoms and either to prepare him for operation or even excuse him operation or guide him to convalescence. Such co-operation with medicine will bring you results hitherto undreamed of. Is it not possible that biochemistry helps to measure the physical aspect of individuality? In the days when acute infections played so dramatic a part in life and death among peoples when medical men were so largely occupied with their visitation and impressed with their own relative powerlessness to battle against them it was only natural that thought should envisage disease more as an evil force from without and set less value on the qualities belonging to the patient.

The banishment of typhoid and other fevers from our midst the power over the protozoal diseases the diminishing force of tuberculosis and syphilis even acute rheumatism with the damage it inflicts on young life is less powerful for evil—these and other achievements bear witness to a changing scene.

The sub-infections which play a relatively larger part in the health problems of today bring home to us the importance of the individual or host and the make up of his body and mind. Their activities in each individual would seem to be determined by some internal factor—some idiosyncrasy or influence which is probably specific for that person. Thus an attack of rheumatoid arthritis from infected teeth is determined as much by the internal factors individual to that patient as by the infective agent and not the least suggestive feature of the recent advance in our knowledge of malignant disease from the brilliant researches of Gye and Barnard is the importance of this internal factor in the production of the disease. In short specificity of the

THE MORTALITY IN IMPORTANT SURGICAL DISEASES, ESPECIALLY APPENDICITIS¹

BY A. MURAT WILLIS, M.D., F.A.C.S., RICHMOND, VIRGINIA

IN becoming fellows of the American College of Surgeons we pledge ourselves to place the welfare of the patient above every other consideration. At times unfortunately our efforts at best will secure for those relying upon our skill merely a measure of relief from their suffering; not infrequently on the other hand it may be granted to us either definitely to hasten the recovery of an invalid or actually to prevent a fatal termination of his illness. As surgeons we are especially privileged but likewise burdened with responsibility. Our patients are largely recruited from the young and middle aged; if our therapeutic efforts are successful there is the gratifying knowledge that we have preserved a life of value to its possessor and the community; if we fail we must face the fact that through our failure the patient has been denied long years of successful endeavor. Are our therapeutic attempts becoming more successful? Are more of the patients who are subjected to surgical treatment being definitely relieved of their ailments than was formerly the case? Especially is the mortality rate in surgical conditions declining with the increase in diagnostic and technical skill?

Reference to the published statistics from most of the leading surgical clinics in this country gives us an answer emphatically in the affirmative. One cannot fail to be impressed with the prevailing note of optimism in these reports. Judging from them the mortality rate accompanying the surgical treatment of diseases of the gall bladder, thyroid, gastro-intestinal tract and pelvic contents seems to be so rapidly approaching the vanishing point that we look forward to an early day when a failure of the patient to recover may be ascribed solely to that person's natural perversity and not to any dereliction on the part of the surgeon or fault in the method of treatment employed.

Unfortunately not all major surgery is carried out under the conditions which exist

in the large surgical clinics from which these optimistic reports emanate. Impressed by the brilliancy of the results obtained by these master surgeons and too often misled into believing that the technique of a difficult and dangerous operation is simple and free from risk to the patient, a constantly increasing number of surgeons in this country with little experience in such grave surgical procedures are resorting to operative therapy. Are all such operators meeting with the success that appears to crown the efforts of their more distinguished brethren? They rarely discuss their results in the pages of the medical journals so that direct evidence as to what is being accomplished is generally lacking.

It is possible however to obtain some of this evidence by reference to the figures published through the Bureau of Vital Statistics. Here also we obtain information of a most comforting nature as regards the mortality rate associated with hernia and intestinal obstruction, surgical diseases of the kidney and pelvic inflammation. In the five year period 1901 to 1905 inclusive the deaths due to the first of these conditions were 13 per 100,000 population; in 1921 it had fallen to 10.7 per 100,000. In the period 1905 to 1921 the mortality rate from surgical diseases of the kidney decreased 71 per cent while that due to involvement of the pelvic contents fell over 6 per cent in the same period of time.

It is distinctly disturbing on the other hand to find that with some other important surgical conditions not only do the data of the Bureau of Vital Statistics fail to confirm the belief as to a reduction in the number of deaths but on the contrary show that there is a steadily mounting rate from year to year. Thus in the five year period 1901 to 1905 the number of deaths per hundred thousand from gall stones was 2.2; in the succeeding years it rose steadily until in 1922 the last year for which figures are available it showed an increase of 77 per cent. In the same period of

thought a few years ago that the simplest of hospitals, built on the Cattle Byre type with open air sun good food, aided by a knowledge of anatomy and physics, as their only armamentarium would have produced the transformations to be found in modern orthopedic hospitals.

And the beneficial results extend far beyond the patients cured for each one of the latter becomes a missionary of health, a nuisance to his family in that he enforces upon its members light and air, to their surprise discomfort, and salvation.

For one cured many are saved which dictum is further emphasized in the hygiene of the mouth for the treatment of oral epulis has done even more by its terrors than its cures.

Next may I let chemistry lead me to another line of thought. In the discovery of hormones by Starling chemical products were found to have a direct control of function. Consideration of the role of these chemical messengers of which carbon dioxide may be said to be the exemplar gives us a wider comprehension of the wisdom of the body and the physical scope of say secretin and insulin is within our ken and gives clearness to our conceptions and range to our activities.

But that minute quantities of a chemical product the output of a group of cells should so far be the arbiter of the physical and mental states of the body that its presence will decide whether the body is to have or not have vigor and beauty and the mind power to think and remember leaves one almost dazed with wonderment. And yet so it is as the isolation of the active principle from the thyroid gland exemplifies.

Again it would seem that secondary and to less extent primary sex characteristics are the result of chemical substances originating in specialized groups of cells and such bodies not only determine sex at the outset but will change sex characteristics during life's progress and with the bodily changes will be the corresponding modifications of mind and character and if one goes one step farther and contemplates the beautiful attributes of the mother instinct which have inspired the art and religion of the world as resulting from stimulation by a chemical product are not the limits of our comprehension passed and our minds unsatisfied? Is the hormone the influence itself or the embodiment of the influence? Or is the physical counterpart of the spiritual quality of influence?

There are in both the same qualities of subtle and reiterated effect in both of them we get a detachment from the material conception of mere bulk and weight and our minds glide back to the

'hilleaven and the grain of mustard seed. The rôle of the infinitely small carries thought to the border country of the material.

From this it is but an easy step to my next theme that is the place of psychology in medicine which term I take to signify the study of the mind in health and illness.

This must claim more of our attention partly because the knowledge of mind has made striking advance and partly because the need for its help increases. And psychology needs to be taken into the texture of medical practice and not regarded as an extraneous aid. Its delicate processes requiring as they do insight and sympathy find encouragement and balance if they are the warp to the woof of physical symptoms.

Standing apart psychological practice may easily fail in acceptance and purpose and even produce antagonism. This is due in part to the outlook of patients and in part to the crudity of many of its exponents.

Broadly speaking patients regard disturbances of mind as things they can avoid and disturbances of body as things they cannot avoid.

Although neurosis is equally if not more prone to attack the higher type of mind its diagnosis is apt in spite of every explanation to debase the patient and prejudice cure. So it happens that the physical and psychical should wherever possible be handled together. Priority of presentation should be given the physical and it should be remembered that the disturbed mind is often helped best by treatment which is incidental and even unwitting. This is only another way of saying that the finer thoughts and feelings may be killed by attempts to give them a too concrete form. And yet by a strange irony there is a school of psychological medicine earnest in advocacy which has presented us a picture of the human mind and its processes so crude and unattractive as to prejudice the acceptance of the great and valuable learning on which it is based.

For in truth medicine owes a great debt to these teachers Freud and others whose inspiration has disclosed to us the workings of the unconscious mind and their relations to those of the conscious. The principles of these teachers are not less true because the latter overstressed the rôle of the sexual instinct and their disciples have mistaken the wood for the trees.

And the conditions of modern life its speed its complexities the fact that mechanical invention has outstripped man's power of adaptation must not only produce exhaustions but set up strains and make the mind enter more into the make up of illness than in the placid

TABLE III—MORTALITY FROM APPENDICITIS
COMPILED FROM 1921 STATISTICS

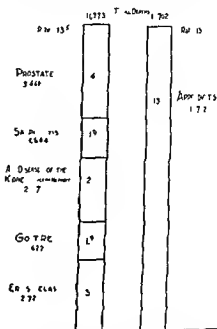
	Rate per 100 000
Ulcer of the stomach and duodenum	4.9
Gall stones	3.9
Pancreas	0.6
Spleen	0.3
Goiter	3.7
Ectopic pregnancy	0.5
Salpingitis and pelvic abscess	2.1

Appendicitis 14.4 per cent

operation with removal of the appendix a procedure most to be commended in interval cases or early in the course of an inflammatory attack but one fraught with the most dire possibilities for the patient if rigidly adhered to in all cases of appendiceal involvement.

In a paper read before the American Medical Association Bernheim has recently called attention to some most pertinent facts in this connection. He says: "The operative deaths in the goiter work of Dr. Crile are hardly more than 1 per cent, the deaths following upon the gall bladder and common duct work at the Mayo Clinic in 1923 were 5.6 per cent."

Deaver, in his surgery of the upper abdomen reports 597 operations for benign disease of the stomach with 29 deaths. Balfour just recently reported 74 partial gastrectomies with one death. Does anyone believe that surgeons in general have any such results as these? But it is the example and the teaching of men of this caliber that influence less able surgeons to undertake serious and complicated operations. A subtotal thyroidectomy in the presence of exophthalmic goiter may never be serious to one with Dr. Crile's amazing skill and vast experience; a partial gastrectomy may be simplicity itself to Dr. Balfour similarly equipped. The removal of a normal appendix from a slim young girl may present no serious difficulties even to our occasional operator; the removal of a perforated appendix in the presence of peritonitis from a corpulent man of 50 is a different story. And yet the rank and file of the profession seem imbued with the idea that all appendectomies are simple. As a result even the layman views the separation from his appendix with no more uneasiness than that with which he looks forward to a visit to his dentist.

TABLE IV—APPENDICITIS IN RELATION TO
OTHER SURGICAL CONDITIONS 1920—REG-
ISTRATION AREA 83 PER CENT OF THE
UNITED STATES

Another important factor is a lack of uniformity in the teaching as regards appropriate treatment in some of the last mentioned conditions. We see this strikingly illustrated in the case of gastroduodenal ulcer: a small minority of surgeons incline to the belief that surgery is not indicated in all cases. The majority of the surgical profession contends that relatively conservative operative measures are demanded and suffice in most instances of ulcer, while an increasing number is taking the attitude that both of the other groups are in error and that very radical operation is necessary.

No less lack of harmony is apparent concerning the opinions as to appropriate treatment of appendicitis. Representing one extreme are the followers of Ochsner who advocate conservative measures, standing for the other are those who believe in operation on every patient as early as he is seen (which may not be early in the course of the disease) with removal of the appendix.

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SUPPURATIVE DISEASES OF THE LUNG DUE TO INSPIRATED FOREIGN BODY CONTRASTED WITH THOSE OF OTHER ETIOLOGY¹

By CHEVALIER JACKSON, M.D. Sc.D. F.A.C.S. PHILADELPHIA, PENNSYLVANIA

THE literature of suppurative diseases of the lung is so huge that one should hesitate to say what it does not contain, but nowhere have I encountered the drawing of a sharp line of distinction pathological or clinical between suppurations due to endobronchial foreign body and those of other etiology. Of the existence of such a line we have at the Bronchoscopic Clinic an abundance of clinical evidence some of which has been presented (1 3, 4 5 6 7, 8 9 18). The purpose of this paper is to call attention not to broncho copy but to the generally unrecognized difference between suppuration due to foreign body and that due to other causes. In the author's opinion such a high percentage of cures cannot be obtained bronchoscopically or otherwise in lung suppuration of other than foreign body origin.

One of the most curious and interesting phases of this subject is the remarkable and complete cure effected by the bronchoscopic removal of a relatively small foreign body from the bronchial focus of a relatively large area of suppuration. Anyone who has contended for months or years with lung suppuration of other etiology saw a post-infectious abscess for instance is amazed to see a foul suppurative process of many years duration involving an entire lobe clear up without further treatment in a few months after the removal of a foreign body from the bronchus

tributary to that lobe. Even more remarkable is the fact that after a few years such a lobe will resume its function and neither by physical signs nor the roentgen ray is it possible to detect unusual fibrotic or other permanent pathological change. We have, not simply an odd case or two but over a hundred of these long duration suppurative cases illustrative of this clinical fact. The usual chronicity of lung suppuration cases in general has led many an unsuspecting practitioner to treat a patient with copious foul expectoration for years until there came a day when a roentgenologist revealed a foreign body. Following the bronchoscopic removal of the foreign body the practitioner has been astonished soon to see the foulness of years standing disappear later the expectoration cease and still later the patient make a complete recovery. Such recovery is the rule after bronchoscopic foreign body removal it is the exception after suppuration of equal duration that has arisen from other causes.

SUPPURATION OF OTHER THAN FOREIGN BODY ORIGIN

The characteristics of pulmonary suppuration are so well known as to need no enumeration here. For purposes of contrast however mention may be made of a few of the many types. Diffuse spreading suppurative pneumonia and sloughing gangrenous processes

¹Read at the Congress of the American College of Surgeons Philadelphia October 6-13 1915

INTRAHEPATIC CHOLELITHIASIS¹

By E. STARR JUDD, M.D., F.A.C.S. and VERN E. BURDEN, M.D., ROCHESTER, MINNESOTA
D. I. of 1917

It has long been known that stones occur in the intrahepatic ducts but the condition is uncommon even in published necropsy reports. The practical significance of biliary calculi in the ducts of the liver is not of much consequence from a surgical standpoint because of the rarity of the finding. Nevertheless it must be kept in mind as an occasional cause for recurrence of symptoms after operations on the gall bladder and ducts. In most of the reported cases the symptoms were severe and at operation or necropsy the lesions of the liver and ducts were extensive. The frequency of stones in the gall bladder and the common duct, their less common occurrence in the hepatic duct and their almost complete absence from the ducts within the liver have led to the assumption that all stones form in the gall bladder. It is extremely rare for stones to reform in the common duct after their complete removal. The small bits of gravel which sometimes form in the liver probably pass through the ducts without difficulty.

CASE 1. A woman aged 50 was admitted to the clinic October 20, 1913. Her chief complaint was pain in the right upper quadrant of the abdomen. For 10 years she had had repeated attacks of pain below the right costal margin radiating to the right shoulder. The attacks were severe enough at times to require morphine for relief. She was troubled a great deal by indigestion and occasionally after meals became nauseated and vomited. She had never been jaundiced. For 3 days preceding her visit she had had almost constant severe distress and vomited every 2 or 3 hours. She was obese weighing 195 pounds.

On examination there was no evidence of jaundice. Tenderness was present over the region of the gall bladder. Examinations of the urine and blood were negative. Gastric acids totaled 70 and the free hydrochloric acid was 60. Roentgenological examination of the stomach was unsatisfactory.

The patient was operated on October 24, 1913 at which time 4 large stones were found in the common duct and 3 in the hepatic duct. They were crushed in removal. The gall bladder was greatly thickened and adherent to the pylorus when cut away it left a thick adherent patch that caused a certain amount of obstruction of the pylorus. The

common duct was greatly thickened and adherent to the stomach, duodenum and gall bladder. Following crushing and removal of the stones the ducts were washed out and probes and scoops passed into the duodenum. The gall bladder was removed and a catheter was sewed into the common duct for drainage. The operation was very difficult. Drainage of the wound was provided for by gauze and rubber tissue. The catheter was removed from the common duct on the ninth day. The patient's convalescence was uneventful and she was dismissed from the hospital on the nineteenth day.

The patient was seen again December 10, 1914 at which time she complained of occasional neuralgic pain over the liver radiating to the right shoulder and down the right arm. In the preceding 2 months she had had periods of feeling sick which were not related to meals and for 10 days she repeatedly vomited large quantities of foul dark material. She complained of soreness in the epigastrium and below the right costal margin. There had been no severe pain or colic. She returned home under medical management.

May 31, 1916 the patient reported that she had felt well until 6 weeks before when the attacks of vomiting recurred and continued at irregular intervals. There was also some soreness below the right costal margin. The systolic blood pressure at this time was 148 and the diastolic 90. Her weight was 155 pounds. Examinations of the urine and blood were negative. The gastric acids totaled 80 and the free hydrochloric acid was 24. There was retention of 700 cubic centimeters. Roentgenological examination of the stomach revealed an obstructive lesion at the outlet.

Operation June 9, 1916 showed the pyloric obstruction to be due to adhesions from the former operation. The liver was apparently in good condition. A posterior gastro-enterostomy was performed. Following this the patient recovered satisfactorily and was dismissed from the hospital on the eleventh day.

February 16, 1924 the patient again came to the clinic. She had had no trouble for 8 years until 10 days before admission when she became nauseated, vomited and suffered from generalized abdominal pain which was especially severe in the epigastrium and left flank. The abdomen became distended. Diarrhea was present at the onset of the attack but this subsided after 3 days under the influence of medicine. Gas could be passed by the bowel. Vomiting and abdominal pain continued after her admission to the hospital and repeated gastric lavage was carried out. She was still very obese. The abdomen was uniformly distended and tender. Urinalysis was negative. The hemoglobin was 80.



FIG. 3 (Case No. Fbdy 1121) Roentgenogram showing the condition in the right lung, due to the presence for 3 months of a tooth. Bronchoscopic removal of the tooth was followed by complete recovery.



FIG. 4 (Case No. Fbdy 1145) Roentgenogram showing abscess of the right lung due to the obstruction of the right bronchus by a tack inserted 6 years previously. The abscess had been drained externally once 7 years before admission, the opening being allowed to close. Suppuration continued as long as the tack was present but ceased a few months after bronchoscopic removal of tack.

series of foreign body cases as to establish the fact beyond question (1 2 3 5 6 7 9 18)

CLASSIFICATION OF FOREIGN BODY SUPPURATION

This subject has been extensively studied at the Bronchoscopic Clinic with results of the utmost clinical importance. As many of these studies have been published (1 2 3 4 5 6 8) it will be necessary here only to repeat a few facts essential to the presentation of the present subject.

For the proper consideration of pulmonary suppuration caused by the entrance of a foreign body into the lung by way of the trachea and bronchi, it is essential to recognize the clinical fact that there are two groups of foreign bodies presenting a marked contrast in their tendency to produce suppuration, namely (1) vegetal substances and (2) other substances.

Another essential is to recognize the clinical fact that suppuration is closely associated with the mechanical condition of the degree and kind of obstruction. These we have (14) classed as

1. By-pass valvular obstruction, permitting a diminished quantity of air to pass in and out. This results in diminished ventilation and impeded drainage.

2. Check valve obstruction in which the air can get in but its escape is hindered. This produces obstructive emphysema in the invaded lung.

3. Stop valve obstruction in which the bronchus is completely closed.

The fundamental importance of the foregoing classifications of kinds of foreign body and kinds of bronchial obstruction is shown by their bearing on the clinical facts that a peanut kernel in the bronchus sets up a suppuration that may be fatal to a baby in 7 weeks (8) whereas a screw may produce suppuration in the lung for 40 years (from childhood to middle age) not only without being fatal but without totally disabling the patient.

With the foregoing clinical facts in mind we may proceed to contrast pulmonary suppuration due to inspired foreign body with that of other etiology.

4.38 centimeters long. Many of them were faceted. The calculi contained 18 per cent of cholesterol and 38.9 per cent of calcium bilirubin. Enhartz also reported a case in which stones were found in the liver but not in the gall bladder. Chopart observed a patient whose liver contained so many concretions that it could not be cut with a scalpel.

The gross appearance of the liver in the various cases was greatly altered. The liver was usually enlarged. The stones sometimes became inclosed in firm fibrous cysts which might project from the surface. Suppurative cholangitis with the formation of abscesses was not uncommon.

In operating for stones in the common duct it is not very uncommon to find stones in the hepatic duct as far up as can be explored with a probe. The condition is ordinarily thought to be produced by the stagnant and infected bile behind a stone in the common duct.

The actual finding of stones in the liver at the time of operation is a great rarity, and in this connection the experience of Lewisohn is unique. His patient was a man aged 31 whose liver was large and nodular and on its inferior surface was a perforated abscess cavity containing stones. One of the nodules on the upper surface of the liver was opened and found to contain stones. The gall bladder contained stones. Cholecystectomy was performed. The patient recovered but a biliary fistula persisted until it closed spontaneously after 8 months. The stones were analyzed and found to contain 48.11 per cent cholesterol.

In most of the cases of intrahepatic stones which have been reported the patients were acutely and gravely ill and they were often deeply jaundiced. Kolleston says that these calculi almost necessarily set up jaundice and a good deal of pericholangitis. On the other hand Murchison says that the symptoms are obscure, that jaundice is absent and the liver enlarged and that pain or colic may occur. It is common knowledge that the severity of symptoms is not necessarily proportionate to the size or number of stones in the common duct. In fact it is not unusual to find a large stone in the common duct

which has never given rise to jaundice. In 1842 Thomson called attention to what was apparently well known at that time that the degree of obstruction produced by a calculus in the gall duct is not uniformly proportional to its size. A large branched stone forming a complete cast of the renal pelvis is sometimes seen in a kidney with good function. We have observed a solitary kidney which contained a large staghorn calculus; the patient was seemingly in good health and renal function was adequate.

Oertel reports the necropsy on a man who died following drainage of the bladder for hypertrophy of the prostate. The gall bladder and ducts were markedly dilated and contained thin bile. A stone 1.5 by 3 centimeters was found at the ampulla of Vater and the common duct at the papilla was 3 centimeters in diameter. There were also many stones in the upper portion of the common duct and in both hepatic ducts. The common duct was 4 centimeters in diameter. The man was not jaundiced and there was no evidence in the liver of previous obstructive jaundice.

In the cases in which a chemical analysis of the stones was made they were found to contain chiefly bilirubin, calcium and a smaller amount of cholesterol.

The unique features in the case which forms the subject of this report are: The finding of many large intrahepatic calculi in a liver which was grossly normal more than 11 years after cholecystectomy and removal of numerous stones from the extrahepatic ducts, and the presence of this condition without the occurrence of jaundice or any clinical evidence of hepatic insufficiency, the condition being an incidental finding in a patient who died from intestinal obstruction.

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FIG. 7 (Case No. Fbdy 1156) In this case the lung suppurated from the presence for 2 years of the hook-shaped piece of wire entirely disappeared after the bronchoscopic removal of the foreign body.



FIG. 8 (Case No. Fbdy 150) Suppuration in left lung resulting from bronchial obstruction during the 6 years presence of the staple. Recovery without treatment other than the bronchoscopic removal of the foreign body.

granulations after a symptomless interval of over 2 years duration evidently resulted in suppuration that in the course of many years increased in severity until an abscess with almost fatal hemorrhages brought the patient to a state of serious ill health after 28 years sojourn of the pin. Bronchoscopic removal was followed by entire and complete recovery. There is today no residual sputum, no roentgen ray or physical signs by which to identify the previously suppurating area.

Case No. Fbdy 1558. Portion of safety pin in the lung for 15 years. A woman aged 9 years having had cough with slight mucopurulent expectoration for 15 years came under the observation of Dr. S. B. Thomas who advised a roentgen ray examination of the chest. This revealed a metallic foreign body looking like a bent wire for the removal of which the patient was referred to the Bronchoscopic Clinic. The patient when questioned vaguely recalled having swallowed a safety pin while trying to close it with her teeth when a child of about 14 years of age.

Professor McCrae reported as follows: Patient's general condition good. No dyspnea. No wheeze. Expansion is diminished on the lower right side. There is dullness which corresponds particularly to the lower right lobe possibly the note was slightly less resonant than normal over the middle lobe. On auscultation breath sounds were distant. I was unable to get any marked alteration on deep breathing and I heard no rales. Vocal fremitus was diminished over the lower right lobe otherwise the examination seemed negative. Signs suggest lower lobe involvement.

Dr. Willis F. Manges reported as follows: There is a metallic foreign body very much the shape of a safety pin except that it has neither a hinge nor an actual spring at the closed end. At the keeper end

there is a hinge with a slight projection on the side toward the point. This projection may possibly be a keeper for the point or the foreign body may be the point portion of a large safety pin with a part of the spring in a U shape bent into the shaft. The point end is toward the median line and directly behind the right border of the heart. It lies in the direction of the right stem bronchus. I suspect that the point has probably embedded itself in the inner wall of the bronchus. There is considerable evidence of a pathological condition in the region of the foreign body as well as distal to it. (Fig. 19)

Bronchoscopy. The right main bronchus was found occluded by an epithelialized granuloma just below the orifice of the middle lobe bronchus. The granuloma was removed with forceps. The ring end of the pin was grasped with rotation forceps and the Manges roller bronchoscope was pushed down over the pin as far as the ring. The bronchoscope being held rigidly the ring was pulled into the tube mouth thus the curve of the pin was straightened out on the roller.

There was no reaction and the patient was discharged a few days later. Her present condition is excellent.

The relatively slight suppuration the lack of general and local reaction to the presence for 15 years of the foreign body in the lung is in part due to the shape of the foreign body which did not cause obstruction to ventilation and drainage until the development after some years probably of sufficient secondary pathological obstructive tissue. The other factor in the limited degree of illness which was



Fig. 1. Appearance of hand in Case 1 a few minutes after application of the sphygmomanometer cuff the pressure being maintained at about 80 millimeters mercury at time of presentation 6 weeks later and 10 weeks later. //// = color. \\\ = anesthesia.



Fig. 2. Appearance of hand in Case 2 a few minutes after application of the sphygmomanometer cuff the pressure being maintained at about 80 millimeters at time of presentation, 4 weeks later and 18 weeks later. //// = color. \\\ = anesthesia.

quite cyanotic after 5 minutes the anæsthetic area became very cyanotic the sensitive area plainly mottled the anæsthetic area cold and the sensitive area warm after 20 minutes the anæsthetic area became extremely cyanotic and the sensitive area darkly mottled.

Under conservative treatment and a continuation of these remedies the evidence of median nerve paralysis gradually and steadily subsided, sensation returned around the base of the hand and gradually extended to the finger tips. Six weeks later sensation had returned to the palm and the area of color change had decreased correspondingly. Ten weeks later the color phenomenon could still be elicited but there was no remaining evidence of median nerve paralysis except anesthesia over the tips of the thumb index and middle fingers as shown in Figure 1.

CASE 2. P. L., a young man injured his wrist and the same phenomenon as that noted in Case 1 was observed. The hand was completely paralyzed over the median area. Operation was decided on immediately before operation and while the patient was anæsthetized the blood pressure apparatus was pumped to 80 millimeters. The first 3 fingers became cyanotic and the last 2 fingers and half of the palm became a mottled red (Fig. 2). With the release of pressure the hand became normal in color.

Operation. There was no vascular lesion and the arteries and veins were found intact. An incision was made along the course of the median nerve in the forearm extending down to the palm. The nerve trunk was traced 3 inches above the wrist and into the palm to its arborization. This necessitated the complete division of the anterior annular ligament. No lesion in continuity was found but at the site of the ventral deformity of the radius about 1 1/2 inches from its lower end there was evidence of slight pressure upon the trunk and a few points were found at which the neural sheath was adherent to

the surrounding tissues. The adhesions were freed and the neural sheath opened and dissected away from the trunk of the nerve for a distance of about 3 1/2 inches. The wound was then closed.

There was no essential difference between the progress of this case and that of the preceding one. The color phenomenon produced by constricting the arm at diastolic pressure was more definite than in the preceding case both before and after the operation corresponding precisely to the anæsthetic area and gradually diminishing both in intensity and extent as sensation returned.

Four weeks after the operation there was a return of sensation as far as the terminal phalanges in all fingers and 8 weeks later sensation was unimpaired and no color phenomenon could be produced.

CASE 3. In this instance the patient had a compound fracture of the elbow joint and a division of the ulnar nerve at the elbow. The patient was seen 8 months after the ulnar nerve had been sutured. Tinel's sign was present to the base of the fifth finger with anesthesia of the fifth finger and one half of the fourth finger. The ulnar area of the hand proper had recovered. The ulnar nerve was regenerating at the rate of about 1 millimeter a day. The production of venous retention by means of a sphygmomanometer cuff at diastolic pressure seemed to produce a very slight fairly discernible difference in color between the anæsthetic and quick areas. This change was so indefinite that several observers could not agree as to its presence but all noticed a debatable change in color. In this case it is possible that the vasomotor fibers were already functioning in the five fingers and that the sensory fibers had not yet come to their full properties. A reversal of the comparative progress of sensation and vascular control noted in Case 1. However this case was practically one of recovered nerve lesion so that the sign was not expected to be positive.



FIG. 11 (Case No. Fbly 124) Abscess of lower lobe of right lung due to insertion of a tooth. Complete recovery ultimately followed the bronchoscopic removal of the tooth without other treatment.



FIG. 12 (Case No. Fbly 1279) The suppuration in the right lower lobe was due to the bullet which had been present for a month in a child aged 4 years. The lung cleared completely with no treatment other than the bronchoscopic removal of the bullet.

Bronchoscopy. The tracheal and main bronchial mucosa were not obviously diseased. On going down the right stem bronchus we found the mucosa of the lower lobe bronchus rather pale and circumferential in appearance. A few small vessels being visible at a number of locations. Just below the orifice of the middle lobe bronchus the lumen of an internal branch of the lower lobe stem was found to narrow down in a laterally flattened funnel shape to a small (about 3 millimeter) lumen which was occupied by a small mass of reddish granulations. The patient not being anesthetized was requested to cough which resulted in squeezing up a small amount of slightly colorous pus. This was wiped away. Dilating forceps were inserted allowed to expand and then withdrawn in the expanded position. The closed forceps were cautiously inserted a millimeter at a time their direction being checked and corrected at frequent intervals by Dr. Manges. When the head of the screw was reached the forceps were allowed to expand sufficiently to grasp it. The stricture having been previously dilated with the expanding forceps no resistance was felt on withdrawal of the screw from its substructural bed. Duration of bronchoscopy was 7 minutes 21 seconds. There was no general reaction; the temperature rose to 99.2 degrees Fahrenheit that evening but subsided during the night to normal. The patient was discharged 2 days later. Now 3 months later she is well on the way to complete restoration of health.

The inspiration of the screw was about 10 years before Roentgen discovered the rays which bear his name. It took about 10 more years for the ray to come into general diag-

nostic use. For 20 years then we may say that the correct diagnosis could have been made at any time had foreign body been thought of as a diagnostic possibility. More over the ease and certainty with which any well qualified practitioner can by physical signs detect an extensive area of bronchial obstruction such as must have been present with a screw of this size in a child less than 7 years old should have lead to a correct diagnosis. Doubtless there were no symptoms for a long time but the physical signs would certainly have been there had they been elicited. The history of foreign body could have been elicited by questioning. This failure to consider foreign body as a diagnostic possibility to be excluded in every case of pulmonary disease with or without a history of foreign body is the result of a shortcoming in the teaching of the medical student. The relatively small amount of pulmonary pathology present in this patient corroborates an observation we have made (1, 2, 3) that metallic foreign bodies seem to have a germicidal action that holds suppurative processes in check until complete obstruction occurs and even then exerts a certain degree of the same power.

'Vasomotor disturbances are the most characteristic disturbances and lead us to suspect that an arterial wound is present in addition to the lesion of the nerve. When they are very pronounced the skin takes on a reddish purple tint as if it had been exposed to the cold for a long time or else it is bluish black in colour and in the latter case it is accompanied by that succulent appearance already mentioned. The least puncture in that case such as the pin prick one gives in testing sensibility makes the blood gush out. Sometimes these vasomotor disturbances are generalised in the hand or foot in other cases they are localised in one or in several fingers (very often the index finger, at other times in the three last) and they are then still more noticeable. In other cases particularly in those where vascular obliteration is compensated by collateral circulation the vasomotor troubles are less pronounced and consist only in a reddish tint of the skin of the whole extremity of the limb but from time to time the patient passes through real attacks of asphyxia of the extremities. The local temperature is always lowered sometimes several degrees in comparison with the healthy side. The hand and fingers are cold whatever the external temperature may be. The disturbance of objective sensibility consists in complete extensive anaesthesia of segmentary type with constantly changing localisation and bearing no relation to the peripheral distribution of the nerve filaments. Thus anaesthesia sometimes occupies the extremity of all the fingers sometimes the whole of the three last fingers or all the index finger or the entire hand or foot' (1 pp 215 and 217)

This new method permits us to produce an immediate and positive definition by color of the areas affected by some nerve lesions. The appearance of these areas is very similar to their appearance in some cases of long standing nerve lesions as has been described above.

CONCLUSIONS

The value of this sign seems to be in its objective qualities. It is a sign which cannot be feigned and as such is of great value in differentiating the malingerer from the unfortunate. It presents the means of delineating in a graphic manner cutaneous areas the nerve supply of which is blocked. It supplements the tactile tests and should be a useful means of studying the physiology and pharmacology of vasomotor control. Its value lies in the facility with which it may be produced in recent cases contrasted with the length of time required to produce visible vasomotor disturbances as they appear in chronic cases.

We realize that the appearance of this sign in 2 cases does not establish it as a constant or unvarying sign of peripheral nerve lesions and that therefore the absence of this sign is of no importance. However, the presence of this sign establishes objective evidence of a nerve lesion.

We have not had opportunity to test for this sign in complete division of the nerve. This report will be supplemented by the report of a larger series of cases at a later date.

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2. THIEL, J.: Nerve Wounds. London: Baillière Tindall and Cox, 1917.



Fig 15 (Case No Fbdy 1307) The abscess in the right lower lobe followed 3 months' sojourn of the dental filling the shadow of which is here seen. Recovery to the previous a stage of health followed bronchoscopic removal of the foreign body. The patient had a bronchial history long antedating the foreign body accident.



Fig 16 (Case No Fbdy 1447) The nail shadowed here had been in the lung of the 10-year-old boy for half his lifetime. Attempted removal by external operation had been unsuccessful. Complete recovery followed the bronchoscopic removal of the nail.

abscess and of pulmonary tuberculosis had been made and abandoned in favor of a diagnosis of bronchiectasis. A roentgen ray examination confirmed the diagnosis of bronchiectasis but revealed the presence of a metallic object about a centimeter in length by about half as much in width deeply down near the bottom of the right lung overlapping the liver shadow. He was referred to the Bronchoscopic Clinic for removal of the foreign body. The presence of bronchiectasis was confirmed by (a) the physical examinations of Professor McCrae and Dr Elmer H. Funk, (b) the roentgen ray examinations of Drs David R. Bowen and Arthur V. Sender and (c) by direct inspection with the bronchoscope at the time of removal of the foreign body. After the removal the expectoration of pus rapidly lessened and within a year had disappeared. At the end of 5 years during which time there was no treatment other than outdoor living conditions the patient's father a physician wrote to us as follows: "Weight 78 pounds height 4 feet 11 1/2 inches. Chest expansion 4 inches. Examination of the chest reveals no abnormality. Generally speaking he is free from cough and he is not troubled with cough. He will be in high school next year."

While it is impossible to say without a bronchoscopic examination that the formerly dilated bronchi are now free from saccululation and are normally proportionate in diameter to the present age of the patient nevertheless the total disappearance of cough and of expectoration are sufficient to warrant an inference of perfect cure and to afford a basis for contrast with the usual course of bronchiectasis due to causes other than foreign body.

SUMMARY OF CASES OF PROLONGED SUPPURATION FROM METALLIC FOREIGN BODIES FOLLOWED BY COMPLETE RECOVERY

In order to convey some idea of the cases on which we base the opinions above expressed we may enumerate a few examples. These are cases of prolonged sojourn only. Cases of

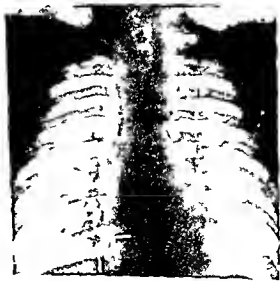


Fig 17 (Case No Fbdy 1415) The dental filling had been in the lung for over a year. Complete recovery followed bronchoscopic removal of the foreign body.

of the spleen, the capillaries of the liver lobules the capillaries of the bone marrow in the connective tissue as wandering cells and in contact with capillaries as Rouget cells. A striking morphological characteristic of the cells of this system is their vital staining namely the uniform granular deposition of a dye stuff in solution in the living cell bodies without in any way injuring them.

It is evident that a system of cells such as the reticulo endothelial system, whose particular function is the digestion of blood cells may show variations of dysfunction both in degree and in the distribution of the site of the dysfunction. Thus one form of dysfunction would seem to be definitely limited to the reticulo endothelial cells of the spleen as in hemolytic jaundice. Overactive destruction of red cells in this organ results in an anemia and jaundice. Removal of the spleen because the derangement is limited to this organ results in a cure.

Another form of dysfunction such as is found in Gaucher's disease is not limited to the spleen but the altered reticulo endothelial cells are found in lymph nodes and bone marrow and liver. Splenectomy in this disease can remove only the major part of the lesion.

Inasmuch as the reticulo endothelial cells get rid of the faded or excessive blood platelets it is logical to think that in a disease such as purpura hemorrhagica in which a low or absent platelet count is a prominent feature some part of this system is over active. If the overactive cells are largely limited to the spleen its removal would promise immediate good results and probably permanent results. But if the entire reticulo endothelial circle is involved splenectomy would do no more than remove a part of the overactive apparatus and such a major procedure in the presence of a profound vascular disturbance as in the acute form of purpura is extremely hazardous to the patient.

In some of the blood diseases involving the blood forming apparatus there is apparently an associated disturbance or overactivity of the blood destroying or reticulo endothelial apparatus as well. Thus in some cases of aplastic anemia and in certain of the leukaemias there is noted a marked decrease in

blood platelets and a tendency to bleed. Splenectomy in these conditions is illogical because the lesion is not limited even partially to this organ.

The relation of decreased blood platelets to purpura hemorrhagica is well recognized. Denys in 1887 first called attention to this fact. Whether this decrease in blood platelets is due to the failure of the megacaryocytes of the bone marrow to form new platelets or to an overactivity of the reticulo endothelial cells in destroying them is still a moot question. The general opinion would seem to favor the theory championed by Kaznelson that the blood platelets are formed in normal numbers but are destroyed by overactive phagocytosis in the spleen and other parts of the reticulo endothelial system.

It is furthermore generally agreed that the blood platelets are the most important formed elements in the blood clotting phenomenon and that they produce a thromboplastic substance. The severity of the bleeding in purpura would therefore seem to depend upon (1) the intensity of the thrombocytolysis (2) the extent to which certain cells of the reticulo endothelial system engaged in thrombocytolysis are distributed in spleen liver bone marrow and lymph nodes (3) the permeability of the capillaries to the circulating blood. The latter consideration is the least understood of the three. The decrease in platelets may favor the ready egress of red cells through the potential spaces between the living endothelial cells of the capillaries. On the other hand the Rouget cells classed by Aschoff¹ as reticulo endothelial cells may play an active part in the permeability of the capillaries. Krogh² and his pupils have made the most valuable contributions to the study of the capillary system. Rouget³ in 1873 first called attention to the existence of peculiar contractile cells on the walls of capillaries whose ramified prolongations of cell body protoplasm irregularly encircled the capillary wall. Vintrup⁴ working in Krogh's labora-

¹ Aschoff L. Lectures on Pathology. New York: P. Hoebe, 1926.
² Krogh A. The Anatomy and Physiology of Capillaries. 1. Univ. of Chicago Press, 1923.
³ Rouget C. 1873.
⁴ Vintrup B. Ztsch. f. d. ges. Anat. 1895.

11 cases Long durations were 1 and 4 years One patient very ill on admission died of septic pneumonitis before any bronchoscopy was done This one case and the fact that no sojourn of longer than 4 years is recorded among our cases suggest an unusually aggressive type of suppuration in cases of teeth in the bronchi This is borne out by the clinical findings in nearly all cases This rather aggressive type of suppurative process makes the fact that bronchoscopic removal was always followed by recovery of the patient all the more remarkable when contrasted with suppurative cases of other than foreign body origin

In cases of a tooth in a bronchus the symptomless interval is short and may be absent the cough appears early usually within 4 hours and is generally frequent and annoying often paroxysmal

Illustrative of the recovery after the more aggressive suppuration associated with dental foreign bodies, the following case may be cited

Case No Ebdy 840 Tooth in the lung for 6 months A woman aged 31 years was ill in bed for 6 months after extraction of a number of teeth The symptoms were severe paroxysmal cough copious expectoration and irregular fever ranging up to 102 degrees F emaciation from 120 to 86 pounds Diagnoses were pneumonia and tuberculosis The sputum was always negative X ray examinations showed the root of a tooth In 4 months after bronchoscopic removal the patient had gained 35 pounds in weight cough and expectoration had ceased and the patient was perfectly well

Many cases similar to the foregoing will be found in our published records (1 2 3 4 5 6)

PATHOLOGICAL BASIS FOR THE DIFFERENCE BETWEEN SUPPURATION DUE TO FOREIGN BODY AND THAT DUE TO OTHER CAUSES

That there is a difference in the tendency to recovery after the removal of the intruder however septic it may have been on inspiration as compared to suppuration due to infective agents that have reached the lungs independent of a foreign body is conclusively proven by a great mass of clinical data When we attempt to determine why this is so we get into the realm of inference with all its potential elements of error A few facts however are apparently well established

The foreign body itself is the chief obstruction to drainage When approached with a bronchoscope in a case of recently aspirated obstructive foreign body the foreign body itself is obviously occupying the lumen of the bronchus and constitutes the chief obstructive agent In such cases we find suppuration early If the foreign body by reason of its size form or position is not obstructive we do not find suppuration in recent cases especially if the foreign body is metallic If however the foreign body has been present for a long time we find the metallic foreign body corroded and buried in granulation tissue the foreign body and the diseased tissue together constituting the obstruction As soon as we disturb this obstacle to drainage pus wells up from below and it is foul showing stagnation

When we go down into the bronchus of a lung that is suppurating from a cause other than foreign body we often find a similar obstructing mass of granulation and granularomatous tissue But it is an abundantly proven clinical fact that removal of the granulations in the latter class of cases while ultimately helpful if repeated as often as they re-form will not produce the remarkable recovery that almost always follows removal of the foreign body only from its bed of granulation tissue in the foreign body class of case

One inference is that the bulk of the foreign body is itself the chief obstructive factor and this is doubtless true of many cases Another justifiable inference is that the presence of the foreign body by its irritation perpetuates the formation of obstructive granulation tissue which disappears after the mechanical irritant is removed That it does disappear in foreign body cases and does not disappear in other cases we know by inspection In many of the non foreign body cases it often continues to reappear even after many removals

Is there a barrier to infective invasion of the lung by way of the bronchi? Another inference is that there is a barrier structural or physiological to infective invasion by way of the bronchial mucosa All our records seem to indicate that there is such a barrier It also seems that the barrier has been more efficient in some cases than in others

- 6 Idem Dilatation of bronchial strictures J Am M Ass, 1912 lvi 1123 (The two patients whose cases are therein reported are alive and perfectly well today 16 years after the curative bronchoscopic removal of the respective metallic foreign bodies)
- 7 Idem Charted experience in cases (Fbdy 631 to 1155) at the Bronchoscopic Clinic Proc Am Laryngol Rhinol & Otol Soc 1923 Also Ann Otol Rhinol & Laryngol 19 4 xxxiii 19 4
- 8 JACKSON C TUCKER G and CLERY L H Arachnid and other forms of vegetal bronchitis Atlantic M J 1925 xxviii 506
- 9 JACKSON C Overlooked for 1 n bodies in the air and food passages Brit M J 19 3 October 17
- 10 Idem Bronchoscopy and Esophagoscopy Textbook Philadelphia W B Saunders Co 1922
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- 19 McCRAE T Clinical features of foreign bodies in the bronchi Lumleian lectures before the Royal College of Physicians of London Lancet 1924 pp 735 787 838

REPORTED CASES OF SPLENICOMY FOR THROMBOCYTOPENIC PURPURA HEMORRHAGICA

Case	Age	Sex	Onset	Duration	Hb	RBC	Platelets	WBC	Neutrophils	Monocytes	Lymphocytes	Eosinophils	Basophils	Other	Ref	Remarks
1	20	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	1
2	25	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	2
3	30	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	3
4	35	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	4
5	40	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	5
6	45	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	6
7	50	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	7
8	55	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	8
9	60	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	9
10	65	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	10
11	70	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	11
12	75	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	12
13	80	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	13
14	85	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	14
15	90	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	15
16	95	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	16
17	100	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	17
18	105	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	18
19	110	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	19
20	115	F	Acute	3 yrs	None	4,000	500	10,000	70%	10%	10%	5%	5%	None	Good	20

TABLE I—DEATH RATE PER ONE HUNDRED THOUSAND POPULATION PERCENTAGE OF INCREASE AND DECREASE

CONDITION	7 1900	7 1905	1901 955	1904 900	1911 105	1914 100	1920	1921 1922
GOITRE	250%							
GALL STONES	17%							
ULCER OF STOMACH & DUODENUM	72%							
APPENDICITIS	51%							
A. D. LESIONS OF THE SMALL INTESTINE	11%							
PEPTIC ULCER	18%							
SALIVARY GLANDS	21%							
ALL PELVIC CONDITIONS	15%							

time the mortality rate from gastro intestinal ulcer increased 72 per cent that from appendicitis almost 31 per cent while the mortality rate accompanying thyroid disease showed the stupendous increase of over 250 per cent

A careful analysis will I believe reveal that these differences are not the result merely of chance there may be found more plausible explanations for the decrease in the mortality rate accompanying the diseases included in the first group while no less definitely it may be explained why we are having a steady increase in the number of deaths due to gall stones ulcer appendicitis and diseases of the thyroid

It has come to be fairly universally established that conservative operative methods play an important role in the handling of a patient suffering from acute intestinal obstruction As regards surgical diseases of the kidney the diagnosis and treatment are left largely to surgeons of especial skill rarely

TABLE II—ECONOMIC IMPORTANCE OF DEATHS FROM APPENDICITIS AS COMPARED WITH DEATHS FROM OTHER IMPORTANT CONDITIONS

CAUSE OF DEATH	1st Be on Age 50	2nd Age 50 Age 50
APPENDICITIS	83%	17%
CANCER	23%	77%
ORGANIC DISEASES OF HEART	20%	80%
DIABETES	29%	71%
GALL BLADDER	32%	68%
ULCER OF STOMACH & DUODENUM	45%	55%
HEMIA & INTESTINAL OBSTRUCTION	48%	52%

does the poorly trained operator undertake such operations as nephrectomy In pelvic inflammatory processes it is firmly established that conservatism is indicated with confinement to bed free administration of fluid and relief of pain through the use of anodynes such measures as these are stressed to the exclusion of the radical treatment advocated in former years

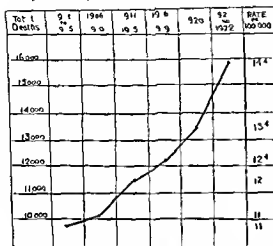
On the other hand in many of the publications appearing in the medical literature the necessity of radical treatment of gall bladder disease is emphatically stressed along with this it is made to appear that the operative measures are comparatively simple Even the layman is coming to consider the loss of his gall bladder the penalty to be paid for the crime of eructating and he must feel that his local surgeon so called is of little account unless he is capable of accomplishing the removal of this entirely superfluous and trouble making structure

With ulcer we see the successive advance first the negation of possible benefit to be derived by medical treatment and the reliance upon the relatively simple operations of gastro enterostomy and pyloroplasty next the insistence upon these methods plus excision of the ulcer and finally (or is it finally?) the contention that only by sacrifice of a large portion of the stomach or ulcer bearing area of the stomach and duodenum is the patient to be relieved of his sufferings With appendicitis there are many, following the lead of Murphy who stress the importance of early

REPORTED CASES OF SPLENECTOMY FOR THROMBOCYTOPENIC PURPURA HEMORRHAGICA—Continued

Case No.	Author	Sex	Age	Duration of illness	Site of lesion	Hb	RBC	Platelets	Colony count	Bleeding time	Clotting time	Postoperative course	Recurrence of symptoms	Result
38	Shimberg (35)	F	64	C	Y	Skin	85	4,000	36,000	Slight	?	BP 4 hrs 85 mm bleeding time 51 min	bleeding occurred 3 mos	Good
39	Wald (4)	M	15	C	5 yrs	% bone	?	92	200	200	?	BP 4 hrs 85 mm 36 days 300 0 most 300 000	No recurrence	Good
40	Hennrich (6)	F	6	A	4 d yrs	N. knee joint	6	5	N. ne	?	?	D. d. few hrs after spl.ectomy	A. lower abdominal hematoma with hemorrhage	Died
41	Egloff (6)	F	?	C	0 yr	% gum tissue	15	125,000	?	?	?	at day 100 BP 5 d 4 yr 30,000 RBC 4,500 000	N. recurrence of bleeding after 4 d	Good
42	Egloff (6)	M	9	A	3 d yrs	% gum tissue bowel	10	45,000	3.5	3 hrs	?	F. 1 d 4 hrs 75 mm at 10	A. pay h. w. d. hematoma in leg thrombosis in leg Tb lymphatic	Died
43	Egloff (6)	M	44	A	3 d yrs	% gum tissue bowel	44	1	90,000	?	?	F. 1 d 4 hrs 75 mm at 10	A. pay h. w. d. hematoma in leg thrombosis in leg Tb lymphatic	Died
44	Egloff (6)	F	17	A	10 d yrs	% gum tissue	?	4	4,800	1 hr	?	BP 1 d 4 hrs 75 mm at 10	A. pay h. w. d. hematoma in leg thrombosis in leg Tb lymphatic	Good
45	Shimberg (35)	F	8	C	?	Skin	?	?	5,000	?	?	BP 6 d 4 hrs 80 mm 3 mos 3,000	P. technique and bruising till 3 mos	Good
46	Shimberg (35)	M	8	C	?	Skin	?	?	3,800	?	?	BP 6 d 4 hrs 80 mm 4 mos 3,000	C. path. h. w. d. hematoma in leg	Good
47	Hennrich (6)	F	8	C	5 yr	% gum tissue	4	4,000	4,000	?	?	BP 6 d 4 hrs 80 mm 4 mos 3,000	M. r. d. h. w. d. hematoma in leg	Good
48	Hennrich (6)	F	46	C	6 mos	% gum tissue	?	4,000	4,000	?	?	BP 6 d 4 hrs 80 mm 4 mos 3,000	A. pay h. w. d. hematoma in leg	Died
49	Hennrich (6)	F	8	C	8 mos	% gum tissue	?	4,000	4,000	?	?	BP 6 d 4 hrs 80 mm 4 mos 3,000	A. pay h. w. d. hematoma in leg	Died
50	Hennrich (6)	F	8	C	?	% gum tissue	?	?	?	?	?	BP 6 d 4 hrs 80 mm 4 mos 3,000	N. recurrence of bleeding after 4 mos	Good

TABLE V—DEATHS IN THE UNITED STATES FROM APPENDICITIS TOTAL AREA FIGURED FROM BUREAU OF VITAL STATISTICS POPULATION 1900 90 MILLION 192 110 MILLION PERCENTAGE OF INCREASE FROM 1900 TO 1922, 30.9 PER CENT



Percentage of Increase from 1900 to 1922 - 30.9%

It is appalling to realize that the number of deaths annually from appendicitis equals all those from salpingitis, pelvic abscess, surgical diseases of the pancreas, spleen and thyroid, gall stones and ectopic pregnancy. The annual toll taken by appendicitis almost equals the combined total of intestinal obstruction, gall stones and gastric and duodenal ulcer. Before the age of 45, more persons die annually from appendicitis than from cancer. Although the total death rate from cancer is 6 times that from appendicitis, 80 per cent of the deaths from appendicitis occur before the

The mortality from appendicitis is 14.5 per 100,000. The mean age at death is 44 years. The mortality is 44 deaths per 100,000 population annually.

TABLE VI—SURGICAL DEATH RATES FROM ACUTE APPENDICITIS RESULTS OBTAINED AT SEVERAL GREAT CLINICS

	Death rate percentage
Ochsner Professor of Surgery University of Illinois reported in Clin Surg 1912 from 1901-1905	4.1
Personal communication Dept 1924	2.0
Deaver Professor of Surgery University of Pennsylvania reported in Ann Surg 1924	
June—	
Using method of Gatch 1901-1905	10.5
Using the Ochsner method 1910-1919	3.9
Gatch Professor of Surgery Indiana University reported in Ann Surg 1924 June rate for 1924	8.7

fiftieth year while only $\frac{1}{4}$ of the deaths from cancer occur before the age of 50. Before the age of 60 there are about four thousand more deaths annually from appendicitis than there are from diabetes. Think of what these figures mean from an economic standpoint. The vast majority of those who succumb to appendicitis are lost during their productive years; those who die from cancer or diabetes have in most instances passed the stage of usefulness.

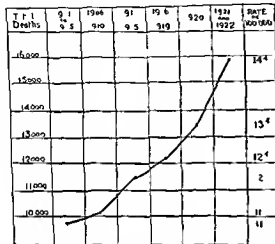
CONCLUSION

Destructive criticism is of small value unless it prepares the way for subsequent improvement. The presentation of facts which has just been made indicates that something is radically wrong with the modern surgical treatment of certain important conditions. Can this be remedied? It would seem that the first step would be the appointment by the American College of Surgeons of a commission composed of the leading surgical teachers of this country, the function of this commission being to direct a thorough investigation of the whole question with a view to effecting some degree of standardization of the methods of treatment of these diseases regarding which at present there seems to be such a complete lack of agreement.

REPORTED CASES OF SPLENECTOMY FOR THROMBOCYTOPENIC PURPURA II ENOIRHICICA--Continued

C N	A. B. Operator	Age	Sex	Duration of illness	Bl. d. g. f. m.	RBC	WBC	Platelets	Diagnosis	Course	Result
67	W. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
68	B. (S)	17	S	C	1	6000	5	5	5	1	Recovery
69	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
70	R. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
71	P. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
72	R. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
73	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
74	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
75	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
76	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
77	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
78	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
79	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
80	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
81	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
82	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
83	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
84	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
85	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
86	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
87	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
88	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
89	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
90	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
91	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
92	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
93	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
94	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
95	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
96	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
97	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
98	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
99	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery
100	E. J. K.	17	S	C	1	6000	5	5	5	1	Recovery

TABLE V—DEATHS IN THE UNITED STATES FROM APPENDICITIS TOTAL AREA FIGURED FROM BUREAU OF VITAL STATISTICS POPULATION 1900 90 MILLION 1922 110 MILLION PERCENTAGE OF INCREASE FROM 1900 TO 1922, 30.9 PER CENT



Percentage of Increase from 1900 to 1922 - 30.9%

It is appalling to realize that the number of deaths annually from appendicitis equals all those from salpingitis pelvic abscess surgical diseases of the pancreas spleen and thyroid gall stones and ectopic pregnancy. The annual toll taken by appendicitis almost equals the combined total of intestinal obstruction gall stones and gastric and duodenal ulcer. Before the age of 45 more persons die annually from appendicitis than from cancer. Although the total death rate from cancer is 6 times that from appendicitis 80 per cent of the deaths from appendicitis occur before the

TABLE VI—SURGICAL DEATH RATES FROM ACUTE APPENDICITIS RESULTS OBTAINED AT SEVERAL GREAT CLINICS

	Death rate percentage
Ochsner Professor of Surgery University of Illinois reported in Clin Surg 1912 from 1901-1905	4.5
Personal communication Sept 1924	2.0
Deaver Professor of Surgery University of Pennsylvania reported in Ann Surg 1924 June—	
Using method of Gatch 1901-1905	10.5
Using the Ochsner method 1910-1919	3.9
Gatch Professor of Surgery Indiana University reported in Ann Surg 1924 June rate for 194	8.7

fiftieth year, while only 1/5 of the deaths from cancer occur before the age of 50. Before the age of 60 there are about four thousand more deaths annually from appendicitis than there are from diabetes. Think of what these figures mean from an economic standpoint. The vast majority of those who succumb to appendicitis are lost during their productive years those who die from cancer or diabetes have in most instances passed the stage of usefulness.

CONCLUSION

Destructive criticism is of small value unless it prepares the way for subsequent improvement. The presentation of facts which has just been made indicates that something is radically wrong with the modern surgical treatment of certain important conditions. Can this be remedied? It would seem that the first step would be the appointment by the American College of Surgeons of a commission composed of the leading surgical teachers of this country the function of this commission being to direct a thorough investigation of the whole question, with a view to effecting some degree of standardization of the methods of treatment of these diseases regarding which at present there seems to be such a complete lack of agreement.

This mortality 1 from ppe dic tis is 4.5 per 100,000. This means that if the population of the United States were 100,000,000 there would be 45 deaths annually. If the population were 110,000,000 there would be 49.5 deaths annually. If the population were 120,000,000 there would be 54 deaths annually. If the population were 130,000,000 there would be 58.5 deaths annually. If the population were 140,000,000 there would be 63 deaths annually. If the population were 150,000,000 there would be 67.5 deaths annually. If the population were 160,000,000 there would be 72 deaths annually. If the population were 170,000,000 there would be 76.5 deaths annually. If the population were 180,000,000 there would be 81 deaths annually. If the population were 190,000,000 there would be 85.5 deaths annually. If the population were 200,000,000 there would be 90 deaths annually.

purpuric eruption no joint symptoms no abdominal pain fundi negative The blood count showed 3 200 000 red cells 1 200 white cells The differential count was normal Bleeding time 5 minutes clotting time 5 minutes No retraction of clot in 24 hours The platelet count was 280 000 Warriss reaction was negative Patient belonged to blood Group I The patient was relieved of all symptoms and signs noted on admission by transfusion of 350 cubic centimeters of citrated blood 1 week after admission No other treatment was needed He was discharged August 12 1920 5 days after transfusion with red blood cells 4 650 000 hemoglobin 83 per cent Bleeding time 2 minutes clotting time 6 1/2 minutes clot retractile

Interval history. Patient attended school regularly and noted no bleeding or tendency to bleed on trauma no hematuria no melena

Patient admitted second time March 8 1921 On the morning before admission while dressing he noted small spots on the legs similar to those noted in July 1920 small purpuric vesicles on thighs trunk and in mouth small eruptions on legs and bleeding from gums He was given immediate transfusion of 250 cubic centimeters of citrated blood and two more of like amount during months stay in hospital He had several nosebleeds and crop of purpuric spots It was thought that oil of turpentine minims helped a little

Patient was followed in out patient department He remained well and free from symptoms until June 1923 The platelet count steadily rose to 50 000 Then he had a mild attack of nausea and purpuric eruption platelets 10 000 He was sent home to bed and became entirely well in a few days

He was admitted the third time October 11 1924 One month before admission he began to have bleeding from gums melena purpuric eruption nausea etc Treated for hemophilia by injections of arsenic and iron He has been in bed for past 3 weeks and feels very weak The skin is waxy pale and there are many ecchymotic spots on the legs and body the teeth are dark colored The gums are bleeding A soft systolic murmur is heard at apex Red blood cells 1 020 000 hemoglobin 23 per cent achromia and stippling white blood cells 15 000 polynuclears 76 per cent platelets less than 20 000 Bleeding time 3 1/2 minutes no clot retraction Vomitus and stools—guaiac 4 plus Five transfusions were administered the first of 1 000 cubic centimeters and the others of 500 cubic centimeters each of unmodified blood at weekly intervals There was a gradual but steady improvement with a gain of 3 kilos in weight Patient continued to have bleeding and eruptions from time to time so he was advised to go to the country for 3 weeks and return for splenectomy Red blood cells 4 100 000 hemoglobin 83 per cent on discharge December 3 1924

He was admitted the fourth time on December 26 1924 A transfusion of 400 mls of unmodified blood was given on day of admission without reac-

tion Red blood cells 5 712 000 Hemoglobin 62 per cent platelets 0-600

Operation. Splenectomy December 27 1924 Patient had a good deal of shock for 1 day post operative and a rather marked fall of red blood cells to 3 060 000 but he soon rallied and has improved steadily ever since Color is good Purpuric eruptions have almost entirely cleared up Bleeding time has come down from 11 minutes to 2 minutes Can now brush teeth with only slight bleeding of gums and no spontaneous bleeding Platelet count as shown on graphic chart for 9 days post operative is as follows

	Day	Count
December 28 1924	first	50 000
December 29 1924	second	80 000
December 30 1924	third	180 000
December 31 1924	fourth	150 000
January 1 1925	fifth	57 000
January 2 1925	sixth	15 000
January 5 1925	ninth	10 000
January 7 1925	eleventh	30 000
January 9 1925	thirteenth	60 000

Followed in clinic

April 11 1925 temperature 98.6 respiration 22 weight 135 lbs He feels all right has no fatigue can work and play as well as ever There is no bleeding He has gained 5 1/2 pounds in 6 weeks and looks perfectly well

Hemoglobin 80 per cent red blood cells 5 088 000

April 27 1925 blood platelets 10 000 Follow up—Six months after operation 444 patient feels perfectly well is active in athletics has no further hemorrhages or petechiae no bleeding on brushing his teeth The scar is firm

Twelve months after operation the boy feels well The following month a few petechiae appeared over the lower extremities Red blood cell 4 100 000 hemoglobin 80 per cent blood platelets 5 000

CASE 79 C T. age 47 Hist No 61775 Day 1925 An Italian language teacher married was admitted December 20 1924 complaining of weakness for 3 weeks and black and blue spots for 2 months She had always been very well all her life except for some nosebleeds occasionally Two months ago she began to have large black and blue spots all over her body at first red then black and blue and then fading out She also noticed many small red spots on her legs Three weeks ago she started to have a nosebleed which persisted off and on and became much worse 4 days ago and was associated with slight dyspnea on exertion and gastric distress She gave no history of intestinal or gastric bleeding Temperature 99.8 pulse 100 respirations 24 blood pressure 110 70

Physical examination shows a well developed and nourished woman who appears quite ill Variable sized ecchymoses are present all over her body numerous petechiae The pupils are negative and react The abdomen obese the liver and spleen not felt no tenderness The extremities are negative

per cent erythrocytes numbered 4 840 000 and the leucocytes 7 300 The blood urea was 46 milligrams for each 100 cubic centimeters of blood Clinical and roentgenographic examinations of the chest were negative Proctoscopic examination revealed an immobile sigmoid

A diagnosis of intestinal obstruction was made and operation was performed February 18 1925 All loops of bowel were found to be greatly distended The location of the lesion was not determined Caecostomy was performed and immediately large quantities of fluid drained off The patient's condition was not materially benefited by this procedure and she died 5 days later

At necropsy the cause of the intestinal obstruction was found to be diverticulitis of the sigmoid which had produced a large mass in the pelvis and had almost completely obliterated the lumen of the bowel (Fig 1) The liver weighed 1 549 grams its surface was smooth light reddish brown and on section the markings were regular and distinct The common and hepatic ducts were moderately dilated The dilatation of the hepatic duct was proportionately increased as it entered the hilus and extended into the parenchyma of the liver In the hepatic duct at the point where it entered the hilus of the liver there was a stone about 1 centimeter in diameter After removal of this stone the course of the hepatic duct was followed into the parenchyma where 10 or 12 other stones were found varying from a few millimeters to 1 centimeter in diameter One large branched stone resembling the branched stones was found in the pelvis of kidneys from 4 to 5 centimeters from the hilus of the liver This stone was lodged in a dilated intrahepatic duct Analysis of the stones showed that they were composed almost entirely of cholesterol

The question naturally arises whether these stones had their origin within the liver There is a possibility that some of the debris from the crushed stones at the time of the first operation was forced into the liver by irrigation of the ducts Erdmann has drawn attention to this occurrence However there can be no reasonable doubt that the large calculi found in the liver formed there and increased in size regardless of the origin of their nuclei French says Gall stones may be found in any part of the excretory apparatus of the liver from the roots of the hepatic duct at the margins of the lobules to the termination of the common duct Gall stones in the interior of the liver are rare Usually the concretions are in the form of small brown or black grains which may fill the ducts Sometimes they are large branched and coral like Cysts may develop around the stones

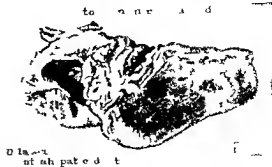


Fig 1 Portion of the liver showing stone in intrahepatic duct

Naunyn maintains that bilirubin calcium calculi are frequently formed in the intrahepatic ducts and usually occur in thick greasy brownish black bile

There are not sufficient data to form an estimate of the frequency of intrahepatic stones Beer in 1904 dissected 50 livers of patients who had died from cholelithiasis and found intrahepatic stones in 6 cases According to Murchison intrahepatic stones rarely occur in the absence of obstruction of the common duct Rolleston says that the condition is very rare he saw only 1 case that of a man who died from diabetes due to secondary pancreatitis

The case reported by Vachell and Stevens indicates that intrahepatic stones do not come from the gall bladder In this case a man aged 52 had had attacks of gall stone colic for 29 years but had never been jaundiced until the last attack He was deeply jaundiced and the liver was enlarged He died while under observation At necropsy the liver weighed 2 750 grams There was an abscess between its upper surface and the diaphragm Its entire surface was covered with small projections caused by underlying calculi It contained many tiny abscesses The gall bladder was of normal size not inflamed and did not contain either stones or bile The hepatic duct and upper end of the common duct were markedly dilated and contained more than a hundred stones The intrahepatic ducts were greatly dilated and contained calculi mucus and bile No part of the liver was free Five hundred and twenty calculi were counted the largest of which was

Diagnosis splenomegaly secondary anemia
purpura hemorrhagica

Operation splenectomy for purpura hemorrhagica

Pathology The spleen was about double its normal size. It was exceedingly friable and there were dense adhesions to the left half of the diaphragm. The separation of these resulted at one point in a difficult point of hemostasis but hemorrhage was completely controlled. The pedicle of the spleen was about normal in size in its relation to the pancreas. The gall bladder and duodenum appeared normal as did the liver and stomach. The splenic vessels were not sclerotic.

A left rectus incision was made. The spleen was drawn to the midline and forward its bed packed with roll of gauze adhesions separated from the diaphragm and bleeding point controlled. Vessels and pedicle were ligated separately. After removing the spleen in section found hemostasis to be good. Gauze picking was removed and closure done as follows. Posterior rectus sheath and peritoneum with chromic stitch locked anterior rectus sheath with continuous interrupted chromic subcutaneous tissue and skin with silk on pearl buttons skin with dermal.

Condition good. Medication none. Drains none. Specimen spleen.

Follow up After 3 months no recurrence of hemorrhage. Periods regular and normal. Cum still bleed slightly when brushed.

CASE 31. L. S. History No 07039 American housewife of 42 was admitted to hospital complaining of epistaxis and bleeding from gums beginning 4 weeks ago with a sudden profuse nosebleed lasting 24 hours a second nosebleed a week later and 2 days before admission gums began to bleed profusely. She was sent in by the Dental Department for treatment of her general condition.

Patient's previous health has been good. She had a myomectomy and appendicectomy 9 years ago and a complete hysterectomy 4 years ago.

Physical examination showed an obese white woman appearing chronically ill. Her skin was coffee colored and there were innumerable petechiae some as large as 5 and 6 millimeters in diameter scattered over her body. There were hemorrhagic areas on her lips. There were hemorrhagic areas on gums. The heart and lung were negative. The spleen was palpable at the costal margin not tender. The little finger of the left hand had an unusually large purple area near the nail on admission.

Laboratory findings. Blood count 4,000,000 red cells hemoglobin 50 per cent white blood cells 13,800 polynuclears 80 per cent (On admission) Blood platelets were practically absent. Large counted as 4,000 and 5,000 on two occasions. Bleeding time, 8 minutes clotting time 6 minutes. Blood Wernicke negative. Blood oxygen capacity hemoglobin 30.4 per cent. Stool showed guaiac plus. There was slow retraction of the blood clot.

She was observed 1 week on the medical side running an irregular fever as high as 104.6 degrees. Herpes developed on lips but petechiae faded and only a few fresh ones were formed. She was given a direct transfusion 300 cubic centimeters of unaltered blood and transferred with the idea of doing a splenectomy.

On admission to the Surgical Ward she developed a cough and for the first 4 days bled persistently from the nose which was not controllable by any of the other methods. The finger became very swollen and there was a marked subepithelial accumulation of blood. Her count fell to 1,000,000 hemoglobin 45 per cent. She was given an indirect transfusion 400 cubic centimeters of citrated blood and after this she stopped bleeding and for the past week has gradually improved with a clearing up of her cough and no further bleeding.

1 week ago however she developed a right otitis media which was followed by a left otitis in the both drums being incised and the X rays of mastoid cells on the right as suggestive of pathology. This has also done well. Her bleed stopped her otitis cleared up and she was discharged with the understanding that she return later for a splenectomy if symptoms recur.

A letter written to the surgeon in another hospital who had operated on the patient at 2 weeks later gave the following information. The patient was operated upon on May 26 1925 under ethyl anesthesia. The spleen was found to be about 2 times its normal size.

Operation Splenectomy. Patient's condition at close of operation not very good. Anemia very perceptible. Patient's condition about 1 hour after operation was apparent. Pulse had slowed down to 100. She had regained consciousness and complained of pain. Within 12 hours her condition changed rapidly. She became pulsed respirations went down to 2 and she died within 30 minutes. No autopsy.

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A NEW METHOD OF DEMONSTRATING MEDIAN NERVE LESIONS

By DENNIS CRILE M D Chicago

IT is conceded by many writers that vasomotor secretory and trophic changes may and often do accompany peripheral nerve lesions. Evidences of this are cyanosis, œdema, redness and congestion of the area affected by the nerve. Tinel (⁷ p 21) says that vasomotor disturbances are practically inevitable in all nerve lesions. He also states:

In all cases the distribution of the vasomotor disturbances is exactly spread over the cutaneous region of the affected nerves. Cyanosis indicates vasomotor paralysis acting upon the vasoconstrictor apparatus. It is exaggerated by a dependent position and by cooling; it rapidly diminishes and disappears if the limb is placed in an elevated position. These phenomena show the loss of tone of the vasoconstrictor muscles in the paralysed region.

Redness or cyanosis of the skin may in certain cases reach an extreme degree. For instance, we find the index finger in certain irritations of the median and the little finger in certain lesions of the ulnar assume a red wine coloured, œdematous and shiny aspect.

No mention has been found in the literature of the distinct phenomenon cited in the following case reports:

REPORT OF CASES

CASE 1. L. M. a young woman suffered a fracture of the lower ends of the radius and ulna. The fracture was reduced and a cast applied the day of the injury and for the following 24 hours the patient experienced great pain over the median nerve area. Apparently there was isœmia of the hand and wrist while the cast was in place. The pressure was relieved.

Three weeks after the accident, when we first saw the patient, there was malunion of the fracture and

complete sensory paralysis over the median nerve area in the hand with a positive Tinel's sign 2 inches above the wrist over the median nerve trunk. No vasomotor disturbances were evident but there was profuse sweating over the anæsthetic area and a painless perionychium of the index finger, the result of an accidental wound while the patient was manicuring her finger nail, which was not noticed because of the anæsthesia. She was advised to soak the hand in hot boric acid solutions and to apply large hot boric acid dressings to it, kept hot by the use of the therapeutic light. All splinting was discontinued and active and passive motions encouraged and after a few days Bier's hyperæmia was employed 3 times daily, the cuff of a sphygmomanometer being used with the pressure at 80 millimeters mercury, which was the patient's diastolic pressure.

DESCRIPTION OF PHENOMENON

The patient noticed that after the hyperæmia had been established for 2 or 3 minutes, the hand assumed a peculiar appearance. The thumb and first 2 fingers and the radial side of the ring finger gradually became cyanosed and tense, the color extending over the thenar eminence and outlining the sensory distribution of the median nerve. The rest of the ring finger and the little finger and the remaining area of the palm became a mottled red. As long as pressure was maintained the appearance of the hand remained unaltered. When the pressure was removed, the hand gradually assumed its normal color. This phenomenon was verified by examination and found to be constant, appearing with certainty within 5 minutes after the hyperæmia was established. A more detailed description follows: after 1 minute of pressure the anæsthetic area became red and the sensitive area mottled; after 3 minutes the anæsthetic area became

A CLINICAL STUDY OF NEPHRITIS IN CASES OF PREGNANCY

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THE literature on the toxæmia of pregnancy shows that the ideas of the obstetrician and the internist are frequently at variance. They do not use the same tests in searching for abnormalities of metabolism nor the same language in describing them. Frequently patients dismissed by the obstetrician appear later in the consulting rooms of the internist with definite nephritis and assert that it dates from the time of their last pregnancy. On the other hand a patient may assure the internist that she had a very severe toxæmia during pregnancy although there is no sign of residual damage. In view of this it seemed desirable to report a series of cases which had been closely observed in the clinic either in the sections on medicine or obstetrics. In 1921 and 1922 100 consecutive cases of renal damage occurring during pregnancy were chosen for study. All patients were included who showed signs of hypertension, cedema or renal injury during their present pregnancy and all those with renal damage which was supposed to date back to a former pregnancy. Forty three of this group who had pyelitis or pyelonephritis will not be discussed in detail here. Recently questionnaires have been sent to all patients concerning their present condition and the information thus obtained has been added to our records.

On the basis of the classification of Volhard and Fahr these cases have been grouped as follows:

	Case
A Pyelitis and pyelonephritis	43
B Hypertension and nephritis	57
I Acute nephritis	
Acute glomerulonephritis	12
Acute nephrosis	1
Acute nephritis (unclassified)	2
II Chronic nephritis	
Chronic glomerulonephritis	12
Chronic focal nephritis	10
Chronic nephritis (unclassified)	7

III Sclerosis (vascular lesion)	9
Benign hypertension	
Malignant hypertension	4

ACUTE GLOMERULONEPHRITIS

Volhard has emphasized the resemblances between true eclampsia so called and the convulsive form of uræmia. He also cites pregnancy as one of the causes of acute glomerulonephritis. He says "but I see no possibility of differentiating clinically nephritis in pregnancy of unknown etiology from a specific nephritis in the non pregnant woman" and again "the histological picture is those unhealed or chronic cases which occur not infrequently correspondsents entirely to that seen in other cases of nephritis of chronic course with special involvement of the small renal vessel in the form of endarteritis obliterans."

Fahr has examined the kidneys in twenty eight cases of eclampsia and believes that the lesion is a degenerative one in the glomeruli a 'glomerulonephrosis'. He also finds many hemorrhagic casts in the tubules which he thinks account for the hæmaturia. He says

"The most important and it appears to me the most constant change is found in the walls of the glomerular capillaries. The change consists primarily of a broadening and swelling of the capillary wall which occurs to different degrees of intensity many times it is only slight scarcely to be noted in other cases it is very marked somewhat agglutinated so that many loops are matted together in an almost homogeneous mass and the sharp cell outlines can no longer be recognized."

On the basis of his experience with nephritis among soldiers and the nephritis of pregnancy Heynemann also emphasizes the similarity in the clinical pictures. He believes that the main point of difference is the great tendency toward hæmaturia frequently macroscopic

CASE 4 In this case of a man with a fracture of the radius caused by a fall 18 weeks before presentation no anæsthetic area of the hand was discernible although there was some atrophy of the muscles supplied by the median nerve and the patient stated that there had been a sensory paralysis from which he had recovered. The color phenomenon could not be elicited as was anticipated since sensation had returned.

The cutaneous symptoms which may be applicable in the cases cited in this report may be partially explained by the fact that irritation of the nerve trunk in the wound is transmitted by the centrifugal fibers to the sensory corpuscles of the skin. These causes affect the vascular tension generally and particularly the groups of small capillaries which abound in the papillæ of the skin the glomeruli of the glands and the sensory corpuscles (1 p 86).

The appearance of the sign which we are describing seems of special value in cases of causalgia which according to S Weir Mitchell is a group of symptoms characterized chiefly by intense burning pain and irritation referable to the nerve fibers affected by lesions of the nerve trunks. Benisty (1 p 87) says "The intense pain and the vaso motor and trophic changes accompanying it are due to what appear to be trivial lesions of the nerve trunks probably inflammatory in nature. We think that these lesions particularly affect the vasomotor secretory and trophic fibers of all the tissues served by this nerve (median). The stronger fibers such as the motor are only slightly interfered with by this irritative process as may be seen by the paresis tremor and twitching other fibers such as the secretory may in some cases be entirely destroyed but the great majority undergo a kind of irritation which reacts on the capillaries of the papillæ of the skin on the sensory corpuscles the skin glands the subcutaneous cellular tissue the joints and bones etc. resulting in the complex of symptoms described by Weir Mitchell under the term causalgia."

The close proximity of nerves and arteries leads one to suspect that injuries to the nerves might cause vascular disturbances. Benisty (1 p 110) states "When there are pronounced vasomotor changes with signs of œdema



Fig. 3 Case 1 Photograph taken 5 weeks after the nerve lesion occurred. Note the fairly sharp line of demarcation on the ring finger.

of the fingers, glossy, cyanosed or purplish skin and trophic changes consisting in ulceration and deformity of the nails an associated vascular lesion should be suspected because on account of the close proximity of nerves and arteries this lesion is very common.

The median nerve is supplied with a branch of the brachial artery which penetrates it down the length of the arm. In the forearm the ulnar supplies it with the artery of the median which accompanies the nerve along its whole course. The branches of the median nerve in the hand are supplied by a number of arterioles independent of those already mentioned.

Benisty further states "In partial paralysis uncomplicated by any vascular lesion vasomotor and secretory troubles are considerable. The skin is cyanosed it is colder and perspires more than the healthy part of the hand (1 p 67)."

It is easy to define the share this system (sympathetic) takes in the case of the sciatic as it is known that most of the vasomotor fibers of the lower extremity accompany this nerve. This fact has been confirmed by Claude Bernard's classical experiment in which he performed section of the sciatic nerve on a rabbit and afterwards noticed active vasodilatation of the blood vessels of the foot with local rise of temperature. Physiological experiments on the upper extremity have not been as numerous or as definite (1 p 82).

clude arteriosclerotic changes as well Volhard further limited its use to primary degenerative changes. Typical examples usually given are the kidney seen in poisoning by bichloride of mercury and the amyloid kidney. By other authors the term is considered to mean a lesion limited to the tubules in contradistinction to one confined to the glomeruli. Others apply the term to a clinical syndrome characterized by massive edema without hypertension and the urinary changes of nephritis but with relatively good renal function except for excretion of water and salts. Still others emphasize the low protein and high lipid content which occurs in the serum in similar cases. Since part of these criteria are pathological and part clinical it is obvious that no exact classification can be made until a larger series of cases has been studied from both standpoints.

We have used the term nephrosis to describe cases occurring in pregnancy in which although considerable edema and the urinary findings of nephritis were found the blood pressure was normal and little disturbance of renal function was evident except for the excretion of salts and water. Heynemann has observed cases of massive edema without significant urinary findings in soldiers at the time nephritis was prevalent. He believes that the famine type of edema can be excluded in these cases since the patients were well fed and well nourished men. Two cases of this type are described.

CASE 3. A primipara aged 24 came to the Mayo Clinic in labor April 1, 1921. Edema was marked up to the knees and the urine contained albumin 3 but no casts or blood cells while the blood pressure and blood urea were normal. She was delivered of a healthy child. Since that time she has had three deliveries at the clinic without any recurrence of the renal symptom.

CASE 4. A primipara aged 21 came to the clinic December 29, 1922. The first menstruation occurred April 9, 1921. About 10 weeks before admission she had had quite a severe attack of diarrhea lasting about 5 weeks. About a month before admission she had noticed intermittent edema of the legs and face. For the previous 2 days it had been present and she had become quite dyspnoeic. Her home physician had found albumin 1 in the urine. Examination on admission showed edema 2 of the legs, edema 1 of the face, normal blood pressure and albumin 4 in the urine. There were no casts or blood cells in the

urine and the blood urea was normal. The patient was delivered of a normal child January 5, 1923. By this time the edema had practically disappeared. She returned to the clinic 4 months later for the extraction of teeth. On examination only albumin 2 was found in the urine while the blood pressure was still normal. There was no further edema.

ACUTE NEPHRITIS (UNCLASSIFIED)

One patient was seen with acute nephritis of pregnancy superimposed on an old pyelonephritis associated with bilateral choked discs. The lesion could not be satisfactorily placed in any group.

CHRONIC GLOMERULONEPHRITIS

Twelve cases were placed in this group. There was a history of acute onset with edema during pregnancy and at the time of admission to the clinic at varying intervals after the pregnancy chronic nephritis with hypertension was manifested together with a tendency to lowered renal function. Edema was not necessarily present at the time of the admission.

The average age of the patients was thirty-four. The average blood pressure reading in this group were 180 systolic and 116 diastolic. The fundi were normal in three cases and in nine there were signs of retinitis or optic change. Blood cells were seen in the urine at the time of examination in six cases. The average of twenty-three tests with phenolsulphonaphthalein was 33 per cent. The average of twenty-four blood urea tests in eleven cases was 119 milligrams for each 100 cubic centimeters. Water tests were made in five cases and were normal in two while in three the excretion of water was delayed. In three cases the urine could not be concentrated well while in two the power of concentration was normal.

CASE 5. A woman aged 25 first came to the Mayo Clinic December 18, 1916. In January, 1914, when 4 months pregnant the patient had influenza which threatened miscarriage. Her doctor found albumin in the urine at that time. Delivery was normal but she felt generally miserable and had a great deal of abdominal pain. The child died from convulsion in 3 weeks. At the time of her admission the blood pressure and renal function were normal but albumin and pus were found in the urine and culture of the urine for bacillus coli was positive. Cysto copy was negative. She returned to the clinic

SPLENECTOMY AS A THERAPEUTIC MEASURE IN THROMBOCYTOPENIC PURPURA HÆMORRHAGICA

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THE etiology of purpura hemorrhagica is not known the pathology is ill defined the differential diagnosis is at times difficult. It is not strange that the therapy should be empirical empirical to this extent at least that nothing is done either by transfusion or splenectomy the two recognized measures in the treatment to remove a known cause.

The rationale of splenectomy consists in the fact that many of the cases of chronic purpura have a splenomegaly and that inasmuch as removal of the normal spleen results in an initial increase in blood platelets the procedure seems logical in a disease characterized by a low platelet count. Credit for the suggestion of splenectomy as a cure for purpura hemorrhagica is usually given to Kasselmann of Prague who did the first splenectomy in this disease in November 1916.¹ It is but fair to state that Dr. Alfred Hess of New York City suggested this therapy in 1913. In a communication from Dr. E. W. Peterson he says: "I find in looking up my record of S. M. that Dr. Hess saw the patient with me in 1913 and suggested that we do a splenectomy to see if it would correct the blood dyscrasia. The patient left the Postgraduate Hospital but was readmitted on August 16 1917. (See Case 71 in this paper.) Dr. Hess later in 1917 emphasized the possible advantages of splenectomy in a paper entitled 'A Consideration of the Reduction of the Blood Platelets in Purpura.'²

There are two very good reasons for the enthusiasm in the profession regarding the operation of splenectomy in so called thrombocytopenic purpura or idiopathic purpura first because of the failure in many cases of medical measures including transfusion to control the main symptom bleeding second because in the majority of cases of chronic

purpura of the amazing immediate improvement both subjective and objective. This has resulted in a popular conception in the profession that splenectomy is an infallible remedy so it is being applied rather indiscriminately to cases improperly selected and not always correctly diagnosed. In the English and American literature individual cases or at the most small groups have been reported without adequate follow up notes. As yet the collected cases with late results have not been reported. It is with this purpose in mind that the writer has reviewed the literature and as a result of a questionnaire sent to members of the American Surgical Association he has added some 29 unpublished cases including 3 of his own making a total of 89 cases of purpura hemorrhagica in which splenectomy was used as the therapeutic measure.

An attempt will be made (1) to point out certain evidence that the disease called thrombocytopenic purpura is not a distinct entity but a phase of a deranged reticulo endothelial system and that merging into this group are other forms of hemorrhagic disease not benefited by splenectomy (2) to differentiate the type of disease suitable for splenectomy and (3) to evaluate the final benefit of splenectomy in the chronic type of the disease.

In the study of diseases of the blood disturbances of the blood forming apparatus and the blood destroying apparatus or both must be considered. Intimately associated with the blood destroying apparatus in fact a large part of it is the system of cells named by Aschoff³ the reticulo endothelial system—a term much in use in the literature at the present time. One particularly interesting function of this system of cells is to devour the used up red and white corpuscles and the platelets of the circulating blood and to metabolize them. These cells are found in the sinuses of the lymph nodes the blood sinuses

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each 100 cubic centimeters of blood in seven readings. The fundi were negative in three cases and showed positive findings in three. In two cases there was a history of edema. The average age of these patients was forty.

BENIGN HYPERTENSION

Adair Mussey and Randall, and others have emphasized the importance of hypertension as an index of the toxemia of pregnancy. The exact cause of hypertension is unknown. Allbutt, Volhard and others have emphasized the importance of so called benign or essential hypertension in which the blood pressure may be high for many years without disturbance of cardiac and renal function. The hypertension of pregnancy differs from the type ordinarily seen in that it has a more acute onset and tends to disappear in most cases following delivery. In a certain percentage of cases however it persists after delivery and the patient may later come to the internist with typical persistent essential hypertension. These are the cases included in this group and an illustrative one is described.

In considering the significance of the hypertension of pregnancy several points must be borne in mind. Volhard has shown that hypertension without edema is seen in a considerable percentage of the cases of acute glomerulonephritis and also that the hypertension may come on very rapidly in the course of a few hours in certain cases. This is one of the reasons he gives for postulating a vascular spasm of the arterioles as an important cause of acute glomerulonephritis. Keith and Thomson have shown in their studies of nephritis in soldiers that in many cases a good renal function was maintained. Thus acute glomerulonephritis without edema and with good renal function would approximate clinically the hypertensive toxemia of pregnancy and the return of the hypertension to normal after delivery might be compared to the similar fall observed in cases of the nephritis of soldiers. Therefore it is not impossible that the hypertension observed in pregnancy including that which ceases as well as that which persists after delivery may be only the early stage of the vascular lesion which pro-

ceeding further can be associated with marked edema and other symptoms of nephritis.

The average age of these nine patients was 32 years. Four were primiparas. Influenza and the intra uterine presence of a dead fetus appeared to be predisposing causes in one case while in four cases there was a definite history of convulsive attacks in pregnancy. In two cases slight edema of cardiac origin was present. In twenty three readings the average systolic blood pressure was 188 and the diastolic 117. The examination of the fundus was negative in five cases but in three cases vascular changes or signs of old neuroretinitis were found. The renal function was good in all cases.

CASE 7. A woman aged 26 first came to the Mayo Clinic July 14, 1932 because of headaches and dizziness. In February, 1920 abortion had been performed because of placenta previa. In November, 1921 during her second pregnancy she began to suffer from severe morning headaches with vomiting. Her home physician found the blood pressure following her first attack of vomiting in February, 1922 to be 165. The urine contained only a slight trace of albumin at times and no blood. There were no chills, fever or edema. Abortion was performed in May. Following this the blood pressure decreased to 140 and she felt better until July when it rose to 170 and was accompanied by a recurrence of the headaches and dizziness. During two weeks in the hospital under our observation her blood remained at a systolic pressure of about 190 and a diastolic of 130. The highest systolic was 225 and the highest diastolic 150. The renal function was normal and the urine never contained more than albumin 2. There was slight reduction in the caliber of the retinal arterioles while direct capillaroscopy showed that the capillaries were of the arterioleclerotic type and that their function was slightly disturbed. When last heard from in December, 1934 she was again 3 1/2 months pregnant the systolic blood pressure was 170 and the urine normal.

MALIGNANT HYPERTENSION

The term malignant hypertension is employed in the literature in two senses. Volhard and others use it to mean a benign hypertension in which the vascular lesion has progressed to involve the vessels of the kidney and thus cause secondary nephritis while Wagener and Keith use it to apply to a group of cases in which the renal function is good but vascular and retinal changes are very severe and diffuse with death as a result of the general vascular lesion.

tory, confirmed Rouget's long forgotten findings and named these cells Rouget cells after their discoverer. Aschoff disputes the findings of Vumtrup as regards the contractility of the cell body but considers them a unit of the reticulo endothelial system. It is conceivable that these Rouget cells stimulated by the same agent that is active in other parts of the reticulo endothelial system might disturb the permeability of the capillary wall to the blood stream facilitating the escape of blood into the tissues.

In a case of acute purpura hæmorrhagica the writer undertook with Dr M J Schoenberg to study the capillary network of the skin of the forearm while applying the Hess tourniquet test. It happened that at the time the patient did not show the positive test so that the production of petechiæ could not be visualized. The patient was very anæmic at the time and had a low blood pressure so that the identification of the skin capillaries was difficult.

The efficacy of splenectomy in purpura depends upon whether the major part of the thrombocytolysis is taking place in the spleen and upon the inciting cause or agent. In the so-called chronic type of the disease with the spleen hypertrophied this would seem to be the case for it is in this type that removal of the spleen produces brilliant and lasting results.

That the normal spleen destroys thrombocytes is favored by the fact that there is practically always a sharp rise in the platelet count after splenectomy both in experimental animals and in clinical cases. But there are other definite factors that cause a thrombocytolysis either by direct action or by overstimulating the elements in the reticulo endothelial system that normally destroy thrombocytes. Cole¹ in 1907 first demonstrated that the platelets could be destroyed in one animal by injecting into it antiplatelet serum developed in another animal. Other workers have reproduced the clinical signs and the blood changes characteristic of purpura by subcutaneous injections of antiplatelet serum.

The same results have been obtained by injecting the by products of streptococcus and

pneumococcus. And it is known very definitely that the lighting up or the failure to drain of a streptococcus focus as in an antrum or sinus infection will result in a great diminution of the thrombocytes and an appearance of petechiæ and purpuric bleeding. It may be that the poisons from bacteria may stimulate some element in the reticulo endothelial system to an excessive thrombocytolysis. This factor of infection is a most important one and may be the underlying cause even in the so called idiopathic purpura cases.

THE TYPE OF CASE SUITABLE FOR SPLENECTOMY

Purpura hæmorrhagica is characterized by five fairly definite findings

- 1 A low or absent platelet count,
- 2 A prolonged bleeding time
- 3 A failure of the clot to retract
- 4 A normal clotting time
- 5 The appearance of petechiæ in the skin

of an extremity below the tourniquet applied so as to shut off the venous but not the arterial flow.

It differs from hæmophilia in that there is no history of bleeders in the family it is not inherited it is more common in women than in men the blood clotting time is normal petechiæ and hæmorrhages are not so characteristically associated with trauma. It is at times difficult to differentiate from an acute aplastic anæmia but in purpura there is almost always a leucocytosis as compared to a leucopenia in aplastic anæmia.

The main point to decide once the diagnosis is made is whether the patient has the disease in the chronic recurrent form or whether it is an acute fulminating type. The former type is usually promptly and permanently cured by splenectomy the latter type is seldom helped by the procedure. The chronic recurrent type of the disease gives a history of repeated attacks of petechiæ purpuric areas irregular bleeding from gums and in women menorrhagia. Bleeding is as a rule not very profuse and is not so apt to occur into the alimentary canal or into the parenchyma of the organs. The fact that splenectomy cures would imply that the major disturbance

Cole R. I. J has Hopkins Hosp. Bull., 1907 xviii, 4

month 2 sixth month 3, seventh month 7, eighth month 7 ninth month one, and post partum, one

FOCAL INFECTION

Focal infection is often discussed in connection with nephritis of all kinds Table I shows results of the examination of 54 of the 100 cases in this series The cases of pyelonephritis thus share in the figures of focal infection Since there was no significant difference between the two groups of nephritis we have put them together We have also tabulated from the history previous infections which might have been partly responsible for the renal damage Facts in this connection were available in 87 cases As a control group we secured the same data on the same number of normal pregnant women who were delivered at the Mayo Clinic during the same period as our original group

TABLE I—NEPHRITIS

	P	t	Co
Previous infections			11
Diphtheria	6	8	
Scarlet fever	22	17	
Pneumonia	19	16	
Typhoid fever	9	4	
Influenza	38	47	
Tonsillitis	41	44	
Rheumatic fever	7	5	
Ileitis	6	6	
Malaria	3	0	
Focal infections by patients			
Dental sepsis	25	27	
Tonsillar sepsis	6	1	
Both dental and tonsillar sepsis	7	16	
Sinusitis	1	1	
No foci	15	2	

Focal infections were slightly more common in the control group but it must be remembered that it is the type of organism rather than the type of focus which is apparently of most importance In spite of considerable discussion in the literature of the possibility of the nephritic symptoms of the toxæmias of pregnancy being exacerbations of pre-existing chronic nephritis we were unable to get a history suggestive of preceding nephritis in more than two

FATE OF THE CHILD

The fate of the child in these cases is of interest (Table II) Since the history in some

cases covers several pregnancies we have taken the results of all pregnancies in all mothers This method tends to minimize somewhat the mortality directly due to the renal lesion

TABLE II—FATE OF CHILDREN

Diagnosis	Preterm	Stillborn	Macrosomia	Birth weight	Indurated	Deceased	Survived
Acute glomerulonephritis	12	15	1	3			75
Acute nephrosis and acute nephritis (unclassified)	3	5					100
Chronic focal nephritis	10	20		2	2		51
Chronic glomerulonephritis	12	16	11	4	1		5
Benign hypertension	9	8	6	1	1		4
Malignant hypertension	4	13	4	2			1
Chronic nephritis (unclassified)	7	17	5	3			65
Total	57	103	25	14	4	1	64
Average							

THE END RESULTS OF NEPHRITIS OF PREGNANCY

The end results of our series from 1915 to 1935 years after admission are shown in Table III Forty of the fifty six patients were traced The state of health which is given as a basis of classification is based on the patients general statements as well as on the more specific data furnished in the questionnaires on blood pressure urinalyses and so forth Some of the patients were re-examined at the clinic

Since advice against further pregnancy was given in most cases few further pregnancies are reported One patient had two miscarriages one had three normal children and four others had normal pregnancies

The end results show that the mortality is high approximately 25 per cent The point of greatest interest is the prognostic significance which is revealed when the cases are grouped according to the Volhard classification at the time of examination In cases diagnosed as focal nephritis benign hypertension and nephrosis the patients recovered for the most part with little residual disease The groups called chronic glomerulonephritis malignant hypertension and chronic nephritis (unclassified) show a high mortality This is particu-

[illegible]

toxin and its localization. Acute glomerulonephritis may occur with or without edema (18). It would be possible to have marked damage of capillaries or tissues with edema and no hypertension and good general renal function (nephrosis). If the lesion extended from the glomeruli to the tubules it would take the form of the combined glomerulonephritic and nephrotic form of Volhard. If the lesion healed with little remaining damage the disease would then be chronic focal nephritis with good renal function. If the brunt of the attack was borne by the vessels rather than by the finer capillaries and the kidney the result would be residual benign hypertension. If the vascular involvement slowly progresses to involve the finer vessels of the kidney malignant hypertension in the sense of Volhard would be the consequence and if the vascular degeneration was extreme and slowly progressive it would take the form of malignant hypertension described by Wagener and Keith with adequate renal function.

A similar course of events might be postulated in pregnancy. The source and nature of the toxin are entirely unknown although many explanations have been advanced. If the toxin acts chiefly on the liver it would cause that type of eclampsia which is associated with hepatic degeneration. Commonly it is more diffuse and widespread in its action and a series of clinical pictures is produced which is very similar to those seen in nephritis.

SUMMARY

Many of the toxemias of pregnancy are associated with nephritis and can be classified as are other types of nephritis not necessarily occurring in pregnancy. The classification of Volhard and Fahr is followed.

The course of fifty seven cases during pregnancy is followed together with the fate of the mother and child over a period of 3 years.

Both nephritis and toxemia of pregnancy seem to be general diseases affecting the cardiovascular system as a whole.

When the toxemia of pregnancy is classified by the same method which Volhard uses for nephritis, a marked difference in the end

results is seen and this difference allows the physician to make a more accurate prognosis both as to the mortality among the mothers and as to the fate of the child in subsequent pregnancies.

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be considered to be the superior mesenteric vessels and it is around these vessels that the rotation takes place

II Elliptical rotation, two fixed points Here the mesentery extends to the right iliac fossa in a lesser degree than normal. The mesentery of the lower part of the ileum is relatively shorter than that of the rest of the small intestine or cæcum and thus furnishes a second point for rotation

III Axial rotation This is rotation of the cæcum on its long axis. It is always present in Types I and II but may exist alone. Types I and II are always associated with a congenital abnormality of the mesentery while Type III may or may not be. When however, the cæcum thus twisted is pouched the volvulus is purely acquired since the pouching is acquired

The direction of the twist is generally hard to define. Clockwise and counter clockwise mean little unless the position of the watch is given. Homans states that in his one proven case it was clockwise looking downward. Tanner that his was clockwise looking upward in other words the opposite to Homans. Beeger considers that the only way to determine the rotation is with the watch lying upon the patient's abdomen. Twist from right to left or left to right, right or left spiral are equally confusing since the patient's left or right is opposite to that of a person facing the patient. Because of this confusion in descriptive terms it is impossible to classify the cases in the literature as to direction of the volvulus.

The most frequent location of the volvulus is in the left hypochondrium being found there in 13 out of 33 cases in one compilation. It was also found in the right lumbar region, right hypochondrium, epigastrium, left lumbar region, left iliac region, umbilical region, pelvis and in a right inguinal hernia sac.

Men are much more subject to volvulus than women. Of the 79 cases assembled by Faltin 56 (70.88 per cent) were men 23 (29.11 per cent) women. In the 57 cases reviewed by Corner and Sargent 42 were in men and 15 in women. In 2 cases the sex was not mentioned. In the 110 cases reviewed by Bundschuh 76 were in men 31 in women and in 3 the sex was not mentioned. Based on

these figures about 70 per cent of the cases are found in men.

Volvulus is typically a disease of younger adult life 45.44 per cent of all cases occurring between 17 and 30 years and 71.4 per cent in patients less than 41 years according to Faltin. Half of the cases were between 0 and 40 years in Corner and Sargent's collection. The youngest was 19 days old the oldest over 70 years. Of Bundschuh's cases 105 mentioned 82 were under 40 years 20 over.

The symptoms of volvulus are those of strangulation or obturation ileus and for this reason definite diagnosis is seldom if ever made. The most frequent symptoms according to Beeger are attacks of pain, vomiting, distention of the abdomen, no stools or flatus. These are all symptoms of strangulation ileus. Jankowski is quoted as stating that an enema of no more than three quarters of a liter can be given with volvulus of the sigmoid flexure but that over two liters could be given with volvulus of the cæcum. In only 4 out of 71 cases did Beeger find that he could administer more than two liters indicating that it is probably of little diagnostic value.

Volvulus may or may not be preceded by attacks of intestinal occlusion. Beeger found that of 67 cases assembled by him there were 28 with complete volvulus (42 per cent) who had never previously had any intestinal trouble. Faltin found that in 27 cases out of 79 the volvulus appeared very suddenly in the night during sleep. Thirty of his cases had complained of previous pain 8 merely of sluggish bowel or colic like pain 22 had had one or more similar attacks.

External elements are occasionally precipitating factors. In 12 out of 46 acute cases Beeger found the following mentioned:

Heavy lifting	Cases
Trauma	5
Excessive eating of food causing flatulence	1
Food causing flatulence followed by violent exertion	2
Pregnancy	1
Postoperative uterus extirpation	1

In addition to the above Faltin found that in two of his cases the volvulus was caused by forceful reposition of a strangulated hernia.

Treatment varies from resection of the affected bowel, if it is gangrenous to simple

of the reticulo endothelial system is localized to the spleen

The acute fulminating type usually gives no history of former petechiæ but there occurs sudden severe uncontrollable oozing of blood from mucous membranes and into the subcutaneous tissues and organs. Hæmitemesis hæmaturia blood in the stools in severe form are more apt to occur. These cases do not respond to one transfusion as promptly as do the chronic forms but may require repeated transfusions before the bleeding stops. In one of the cases reported from the Mayo Clinic 12 transfusions were given in 40 days. These cases should be tided over by transfusions until the bleeding has stopped and when built up splenectomized to prevent a recurrence.

In the 81 cases collected there were 8 cases operated upon during the acute stage with 7 deaths—all within a very short time after the completion of the operation. Of the 73 cases of the chronic form there were only 6 post operative deaths showing the relative safety of splenectomy in the chronic form.

There are certain features characteristic of the chronic type. The immediate return to normal bleeding time the abrupt sharp rise of blood platelets to 200 000-600 000 with a sharp drop within 10 to 60 days to normal or a low figure the clearing up of the muddy palor the disappearance of petechiæ and purpuric spots and cessation of bleeding from nose gums and uterus are the spectacular features. Perhaps the most important feature to the patient is the sense of well being felt within a day or two.

Kaznelson's first case splenectomized in 1916 has had no recurrence of symptoms of any sort. He reports two more cases 6 years after operation in one of which the result was good in the other fair. Buncke reports a 5 year result with no recurrence. Ehrenberg reports a 4½ year result with no recurrence. Fourteen cases are reported that have gone a year or more without recurrence of symptoms.

Keisman reports one case 1 year after operation without improvement.

Clopton reports a poor result in a case 1 year after operation the result of a tonsillar infection.

In a few cases there were later occasional nosebleeds and petechiæ.

Some of the cases were reported as having recurrences of petechiæ and purpuric spots following infections such as tonsillitis and influenza—supporting the etiologic factor of infection.

Many of the cases followed showed a persistently low platelet count although there had been no recurrence of symptoms.

Three cases have been reported as dying at intervals of 3 weeks to 18 months after splenectomy from intracranial hæmorrhage.

SUMMARY

Of the 81 collected cases there were

73 of the chronic type

8 of the acute

6 deaths in the chronic varieties

7 of the 8 acute cases operated upon died

Of the 61 followed cases

51 gave good results

4 fair

6 poor

Considering the brilliant immediate results and the restoring to normal living of the great majority of the cases of chronic purpura following splenectomy it may be said that this operation has contributed the greatest advance to the therapy of the purpuras but it must be remembered that these results are largely limited to the chronic variety. Furthermore it should be emphasized that the patients after splenectomy should be cautioned and guarded against infections in order to obtain the best results.

AUTHOR'S CASES

CASE 18. A 18 year old male was admitted to the hospital first July 23 1908. His chief complaint was spots on the body which appeared 4 days ago. The family history showed no hæmophilia or purpura. There is no history of exanthemata. Patient had pneumonia at 5 and again at 11. He has had no rheumatism or sore throats occasional bronchitis. Five days before admission patient vomited three times. No blood. Four days before admission he noted many fine red spots on the feet and legs. The next day the spots were higher on the body and arms and in the evening there were large ecchymoses on the body. The day before admission the urine was bright red. The findings on admission were epistaxis bleeding gums melana hæmaturia and

On January 9, 9 days after admission and during the third week of his illness he complained of a severe pain in the right lower quadrant of the abdomen. His temperature which had steadily remained above 102 degrees immediately dropped to 97 degrees and the pulse dropped from 100 to 80 per minute.

Before the onset of pain there was only slight abdominal distention but within 12 hours this became quite marked. A blood count now showed 100 white cells and 80 per cent polynuclears. He was covered with a cold clammy sweat and the pulse became small and thready. The pain was intermittent in character. When present it was very intense but relief was almost complete in the intervals between paroxysms.

A surgical consultation was now requested. When seen at 2 p.m. this patient did not impress one as being acute and dangerously ill. His face was placid and the pain had temporarily ceased. The abdomen was moderately distended but was not tender or rigid anywhere. In fact the abdominal wall seemed flaccid. An indefinite resistance was felt across the lower abdomen giving the impression of cord like loops of intestine. The picture was not that of a perforation. The pain was that of an obstruction but why should an obstruction occur in the third week of typhoid?

It was considered advisable to wait a few hours longer but a second blood count showed 1600 white cells and a polynuclear rise to 93 per cent. A provisional diagnosis of a walled-off perforation with obstruction was made. Operation was done by the author and was carried out entirely under local anesthesia—0.5 per cent novocain being used.

Through a 6 inch incision from umbilicus to symphysis an examination was made. An enormous coil of dilated large bowel was found filling the pelvis. The size was that of an ordinary muskmelon. After considerable study it was shown to be a huge cæcum which was entirely loose and free from attachment to the posterior abdominal wall well up to the hepatic angle. This had rotated a half turn causing the ileum to pass anteriorly and come to lie on the outer side of the cæcum and enter it from the right instead of from the left. Rotation clockwise looking vertically downward from head to foot. The volvulus was untwisted. A needle was passed through the base of the appendix into the cæcum and by means of a suction pump the air which was causing the great distention was removed. A purse string was inserted the infected appendix removed and the stump buried.

To prevent a recurrence of the volvulus the anterior longitudinal band was sutured to the anterior abdominal wall. No perforation was present. The uterine dressing was done in layers and no drainage used.

On the day following operation the patient seemed improved. His bowels moved well and a large amount of flatus was expelled. In the afternoon he had a chill and the temperature rose to 103 degrees.

pulse to 130 and respirations to 50. There was slight dullness in the lower left chest posteriorly with fine crackling râles. Moist râles were present in the axilla and anteriorly. Heart sounds were poorly hardly perceptible. The bowels moved in response to enemata. Flatus was passed. There was occasional vomiting.

On the second day following operation the entire chest was full of moist râles. The pulse became imperceptible and the patient died. In my opinion this patient died of pneumonia. Please note however that it was not an ether or gas pneumonia because no general anesthetic was used. A post mortem examination was refused.

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no edema is present The knee jerks are equal and active

Urine examination shows albumen 0 sugar 0 frequent white blood cells occasional red blood cell at times Wassermann negative Red blood cells 4 100 000 hæmoglobin 95 per cent white blood cells 10 300 polynuclears 59 per cent leucocytes 24 large mononuclears 10 eosinophils 6 Red blood cells show slight variation in size and shape White blood cells show occasional lymphocytes with coarsely granular cytoplasm Platelets practically absent Clotting time 9 minutes control 9 bleeding time 8 minutes control 5 minutes Stool is negative for blood Patient was observed on the medical service for 3 weeks and then transferred for

Splenectomy January 30 1925 The spleen was two to three times larger than normal Some adhesions were found along the lateral abdominal wall a thickened lienorenal ligament Pathological report Spleen uniformly enlarged with yellowish patches on capsule which microscopically prove to be old organized areas of purpuric hæmatomata Diagnosis purpura hæmorrhagica

Patient did very well but had 2 severe nose bleeds one 15 days after operation the other 19 days after operation at which time the blood platelets were very low She was discharged February 16 1925 in good condition Th platelets which were practically absent before operation gradually increased after operation reaching a maximum in 6 days and then falling off There was a leucocytosis following splenectomy The platelet count after operation is as follows

Day	Platelets	Clumps
1st	25 000	No clumps
2nd	30 000	No clumps
3rd	45 000	1-2 clumps
4th	55 000	No clumps
5th	70 000	Few
6th	100 000	Several
7th	0 000	Few
8th	20 000	No clumps
20th	5 000	Practically absent

The white blood count after operation was as follows

Day	Wht blood	Polynuclears	Leucocytes	Large
				nuclears
1st	60 500	87	11	2
2nd	48 900	81	13	6
3rd	2 100	81	14	4
4th	27 000	77	20	3
6th	24 800	80	17	2
7th	26 000	85	10	5
8th	24 500	83	13	4
9th	92 400	86	10	4
10th	92 400	86	10	4
10th	2 600	90	14	2
20th	24 000	89	0	11

Bleeding time at operation was 8 minutes 6 days postoperative 1 minute 30 seconds 0 days 3½ minutes.

Clotting time at operation was 9 minutes 6 days postoperative 5 minutes 10 seconds 20 days 5½ minutes

Follow up Two months after operation Result 4 3 4 Platelets 2½ months postoperative 10 000 Bleeding time 2½ months postoperative 18 minutes Clotting time 2½ months postoperative 7 minutes

Follow up 6 months result 444 feeling very well No petechiæ Blood platelets too few to count Red blood cells 4 500 000 hæmoglobin 80 per cent

Ten months follow up 444 no bleeding of any kind No petechiæ Feels perfectly well Red blood cells 4 800 000 hæmoglobin 83 per cent blood platelets 7 000 bleeding time 2 minutes

CASE 80 A V History No 62529 Readmission The patient is a 25 year old Italian housewife who was in the hospital for emergency treatment of a case of ulcerated strangulated hæmorrhoids the early part of April 1925 She was discharged after 5 days completely cured of this condition the dilated thrombosed veins having been clamped and ligatured During the routine examination she was found to have a palpable spleen which was enlarged almost a hand's breadth below the left costal margin and as in her history there was made out a story of bruising easily and a prolonged bleeding time for small cuts and the like the splenomegaly was further investigated and the following laboratory findings were reported

Blood count Red blood cells 3 384 000 hæmoglobin 53 per cent (Sahli) white blood cells 10 900 polynuclears 74 per cent lymphocytes 26 per cent

Coagulation time 4 minutes control 3½ minutes bleeding time 3½ minutes control 1 minute Blood platelets 15 000 in April 20 000 in May

She was followed in the out patient department by Doctors Hanford and Whipple and although she was having no symptoms from her purpura hæmorrhagica (the diagnosis made on the above) she was advised to have her spleen out and is readmitted for this operation

Two days ago she coughed a little and has had a slight dry cough during the day since then

Physical examination Temperature 99.0 pulse 86 respiration 24 There has been no change since admission last month Her color is the same dark olive and her features are more those of a negress than of an Italian No petechiæ or ecchymoses are present The eyeballs are prominent and pupils react the tongue is clean There is no bleeding from the gums The pharynx is negative the tonsils are not enlarged or inflamed The thyroid is not enlarged The lungs are resonant throughout no râles are heard The heart is not enlarged has regular sounds of good quality Blood pressure is 130-70 (left arm) The abdomen is soft and not tender no scars or herniæ no tenderness The spleen is quite definitely enlarged about 7 to 8 centimeters below the left costal margin and extends a little anteriorly Pelvic examination not made There is no return of the hæmorrhoids no anal tenderness

CANCLR OF THE UMBILICUS SECONDARY TO CANCER OF THE CÆCUM

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THE present case of metastatic malignancy of the umbilicus secondary to adenocarcinoma of the cæcum is reported because it is an instance of a rare condition and also because it serves to emphasize the importance of the navel as a mirror of the intraperitoneal pathological condition.

Cancer of the cæcum with metastases to the peritoneum, umbilicus and skin. S. W. G. H. S. No. 1649. Mrs. R., a Norwegian American housewife of 63 years, entered the hospital February 18, 1925, complaining of abdominal pain, vomiting and constipation.

The family and past histories were essentially negative with the exception of the fact that for many years she had been troubled with epigastric distress and gaseous and sour eructations coming on shortly after meals.

She dated her present illness from 2 years before entrance at which time she began to have pain across the lower abdomen. Two weeks after the onset of the pain she called her physician who made a diagnosis of acute appendicitis and advised immediate operation. Exploration revealed a distended small bowel and an inoperable tumor of the cæcum. Since that date she had been gradually losing weight and strength and becoming more and more constipated. The pain in the right lower quadrant had persisted and grown worse.

About a year after the onset of her trouble she noticed a small pimple at the umbilicus which bled when it was scratched. It continued to increase in size and at entrance was a raised, ulcerated fungating growth 6 centimeters in diameter.

Two days before entrance to the Wisconsin General Hospital she was taken with a severe cramp-like pain in the lower abdomen. She vomited several times during that day and the next and only by repeated enemata was she able to accomplish any movement of her bowels. The day of entrance she became decidedly worse vomiting and wrenching every few minutes. On entrance to the hospital the vomiting had stopped and she felt much better. The vomitus had never been fecal.

Physical examination showed evidence of considerable recent loss of weight. The liver was easily palpable. In the right lower quadrant of the abdomen was a hard irregular tumor about 15 by 7 centimeters which seemed to be attached to the anterior abdominal wall. The umbilical scar was replaced by a dark purplish red fungating tumor 5 centimeters in diameter and raised 1 centimeter above the skin surface. In the skin 1 centimeter

below this and slightly to the right was a hard nodule 1 centimeter in diameter.

Macroscopic examination of the tissue removed from the umbilical tumor showed it to be a typical adenocarcinoma. *Bosum enema* revealed an irregular annular constriction of the cæcum. The plate also showed suggestive shadows of gall stones.

Operation. Ileostomy was performed February 21, 1925, by Dr. C. A. Hedblom.

A midline suprapubic incision was made. There was a moderate amount of free serous fluid in the peritoneal cavity. A very much dilated and hypertrophied loop of small bowel presented. There was a carcinomatous nodule on the peritoneum just to one side of the incision between the pubis and umbilicus. Exploration showed a large mass in the ascending colon which was adherent to the parietal peritoneum. The whole mass was perhaps 8 to 10 centimeters in the direction of the bowel and was nodular and sclerotic. No further exploration was made. A loop of the terminal ileum close to the cæcum was lifted into the incision and sutured to the peritoneum for a permanent ileostomy. The wound was closed in layers to the loop.

The patient had an uneventful convalescence and was discharged from the hospital on March 31.

The umbilicus is a permanent record of intra uterine existence. Most of its diseases hark back to this period and have their origin in its abrupt termination. Until after birth the main blood stream of the organism flows through the umbilicus. Until a short time before this it encompasses outpocketings of the gastro-intestinal and genito-urinary tracts in the form of the omphalomesenteric duct and the urachus. It is not uncommon for these to remain patent or for portions of them to become pinched off and persist as cell rests or cysts. It is as if the viscera retreating hurriedly into the peritoneal cavity had jammed their tails in this hastily closed door. The umbilicus may contain therefore besides the normal squamous epithelium epithelium of intestinal bladder or even gastric type. All of these may give rise to primary carcinomata.

It remains also as a route of communication between the venous and lymphatic systems of the peritoneal cavity and the body surface.

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picture is usually distinctive. No definite nodule develops; rather there appears a deep induration at the umbilicus which gradually takes on the appearance of a phlegmon. As the viscus perforates into the abdominal wall, fluctuation occurs and incision at this time will often yield definite pus. The condition goes on to malignant ulceration, fistula formation and discharge of gastric or intestinal contents.

Microscopically the primary growths are either typical squamous cell epitheliomata or adenocarcinomata of the intestinal type. A secondary tumor reproduces the characteristics of the original lesion. When this is in the intestine it is difficult to distinguish microscopically between primary and secondary growths.

SYMPTOMS

In primary growths the symptoms will be wholly local or those incident to metastases. In secondary tumors in most instances there will be symptoms of advanced malignancy of one or another of the abdominal viscera. This is not always the case. In 14 of the secondary cases the umbilical nodule was the first thing noted and at the time of observation there were no symptoms referable to the original lesion, this being discovered accidentally at operation or at postmortem examination. This point is of considerable clinical importance, making it requisite in all cases of carcinoma in this region to make a thorough search for a latent visceral focus. Occasionally there will be a history of a long standing umbilical hernia. In this case it is

probable that the growth is an extension of an ommental nodule adherent in the sac.

DIAGNOSIS

Carcinoma must be distinguished from many other tumors which may arise at the umbilicus. To recount them all and give their distinguishing characteristics is beyond the scope of this report. The more important of them are hernia, abscess, hypertrophy, adenomyoma, cysts (dermoid and those arising from remnants of the omphalomesenteric duct and the urachus), benign tumors of vascular, lymphatic, fat or connective tissue origin and sarcomata.

CONCLUSIONS

1. A case is reported of cancer of the umbilicus secondary to adenocarcinoma of the cæcum.

2. There is presented a clinical and pathological summary of the 101 instances of carcinoma of the umbilicus which to the present time have appeared in the literature.

I wish to express my thanks to Dr. C. A. Hedblom upon whose service the case occurred and who was kind enough to allow me to report it, also to Dr. E. M. Medlar who examined the tissue removed at biopsy and made the microscopic diagnosis.

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- The author wishes to thank Dr. C. A. Hedblom for his kind and helpful suggestions.

in the former, while in the latter it is either absent or evident only microscopically. In dependently one of us (Keith) suggested to Mussey the marked similarity of these two conditions. Mussey has reviewed the literature on the subject and has noted the close clinical similarity between a group of cases with pre-eclamptic toxæmia and acute glomerulonephritis. This clinical similarity raises the possibility of a common etiology.

The term glomerulonephritis must be used with a clear definition of its meaning. It does not necessarily mean a lesion without tubular disease but rather a lesion that is primarily and chiefly limited to the glomeruli. Since the blood which reaches the tubules has first passed through the glomeruli it is obvious that any toxin will first affect the glomeruli but if it is of sufficient strength and acts for a sufficient length of time it will eventually involve the tubules as well and cause a diffuse nephritis. On the other hand according to Volhard the glomerular injury which can be demonstrated histologically is not proportional to the degree of toxæmia and in an early stage may not be demonstrable microscopically.

The most important symptoms of glomerulonephritis are hypertension, œdema and more or less hæmaturia. In mild cases œdema may be present without hypertension and yet there will still be lesions in the glomeruli. More frequently the hypertension will be present with little or no œdema. Hæmaturia may be so scant and of such short duration that its detection is difficult. Other symptoms of nephritis such as oliguria, albuminuria, cylindruria, dyspnoea, headaches, visual disturbances or convulsions may also be present.

Our twelve cases of acute glomerulonephritis were so classified because of the history of acute onset during pregnancy, the presence of hypertension and œdema and the other signs of acute glomerulonephritis just enumerated.

The average age of the patients was twenty-three. Nine were primiparas. Œdema was present while the patients were under our observation in ten cases and a history of earlier œdema was obtained in the other two. Of seventy-five blood pressure readings on

these patients the average reading for systolic pressure was 151 and for diastolic 104 millimeters. The fundi were examined in ten; in six they were normal while in four they showed pathological changes. Blood cells graded from 1 to 3 were found in the urine of five cases. The phenolsulphonphthalein readings averaged 38 per cent while the blood urea averaged 34 milligrams for each 100 cubic centimeters. Volhard's water test was made in three cases; it was normal in two but showed delayed excretion in the third. Five of the patients were delivered at the clinic; four children were normal and one was stillborn. The following cases are illustrative.

CASE 1. A primipara aged 27 came to the Mayo Clinic September 9, 1921, 8 months pregnant. Three months before her legs had begun to swell and 2 weeks before the swelling had extended to her face. Her home physician had been examining her urine regularly but found no albumin until 2 months before admission. There was marked œdema from the waist down and the face was puffy. The systolic blood pressure was 152 and the diastolic 110 both persisted at about this level. There was albumin 4 in the urine, casts 3 and erythrocytes 1. The blood urea was 62 milligrams for each 100 cubic centimeters. The patient was delivered of twins September 10 and following this her symptoms rapidly cleared. She returned to the clinic June 22, 1922, three months pregnant for several days observation. Her blood pressure was normal there was no œdema and her urine never showed more than albumin 1; there were no casts or blood cells. Her urine was examined every 2 weeks until term when she was delivered of a normal child without further trouble.

CASE 2. A primipara aged 17 entered the Mayo Clinic September 22, 1921, in labor. She had noticed general œdema for about 1 month. The systolic blood pressure was 152, the diastolic 80 and the urine contained albumin 4 and a few casts. The blood urea was 26 milligrams for each 100 cubic centimeters. She was delivered of a normal child. About one half hour after delivery she had a slight convulsion and went into collapse which seemed to be of cardiac origin and about four hours after delivery after a number of short convulsions died. Necropsy showed marked diffuse nephritis, hypertrophy of the left ventricle and general obesity.

ACUTE NEPHROSIS

The term nephrosis has been used in a widely varying sense in the literature. Originally, it was used by Mueller to denote degenerative as opposed to inflammatory changes in the kidney. Since this would in

6 The definite isolation of this condition cannot be made on account of the absence of complete microscopical and macroscopical findings

7 The identity of dyschondroplasia and osteogenic exostoses needs further pathological anatomical control

8 The etiology is absolutely unknown

The three cases reported by Mohr are briefly as follows

CASE 1. Girl aged 10 years with practically a negative history developed a slight limp when 5 years of age and was found to have at that time a shortening of from 2 to 3 centimeters. Examination showed a hemistrophy of the right side the hand and foot being also both involved. The right upper extremity was 6 centimeters shorter than the left and the lower extremity 8 centimeters shorter than on the opposite side. The deformities were a compensatory scoliosis and an equinus position of the foot on walking.

CASE 2. Girl aged 12 years gave a negative history. At 3 years of age a deformity of the right knee was noticed and about the same time a deforming lesion of the left hand was found. At the time of the examination a marked genu valgum was present and the right lower extremity showed 10 to 25 centimeters shortening. A later observation on this same case showed a subluxation of the hip on the affected side and a valgus deformity of the knee of nearly 90 degrees.

CASE 3. Boy aged 6½ years gave a negative history. The child learned to walk at 13 months of age and shortly after this a slight limp was noticed. On examination the right arm was found to be about 5 centimeters short and the right leg 5.5 centimeters short.

Coon in 1911 reported a case which after a search of the literature seemed to be at that time the only additional case of dyschondroplasia after Mohr's on record.

Coon believed that the only true diagnostic method was the roentgenogram the only similar picture being that of multiple cartilaginous exostoses.

The patient a boy aged 15 years gave a negative family history and his previous history showed apparently nothing which could be directly connected with his condition. When he was less than 3 years of age a swelling was noted in the region of the right wrist following an injury a few weeks before and from this time on other bunches appeared in both the upper and lower extremities on the right side and the parents noticed that these extremities were not growing as fast as those on the left. When he was 13 years of age some small lumps had appeared on the

left hand. The examination of the boy showed the right side to be much deformed the upper extremity being 6 to 25 inches shorter than the left and the lower extremity 3 inches shorter than the opposite side. The wrist and elbow were widened and masses could be felt on the humerus but although the knee was thickened and there was a slight rounding of the metatarsals no such masses could be made out in the affected lower extremity. A slight degree of genu recurvatum was also present and the right foot was smaller than the left. The femur tibia fibula and ulna on the right showed abnormal curves. The roentgenograms were very striking and showed much more bony involvement than was apparent clinically. Three different types of such involvement were observed. The first type which was present also on the left side was confined to the metatarsals metacarpals and phalanges and showed areas of lessened density with tumor formation which probably represented true chondromata. The second type was present at each end of all the larger long bones of the affected extremities and showed irregularity of outlines increase in density and a peculiar longitudinal striation with no tumor formation. The third type of involvement showed exostoses these occurring on the olecranon acromion and coracoid processes and on the shaft of the humerus.

Ehrensried has apparently made the most exhaustive search of the literature on cartilaginous tumors and has written two articles on what he calls "Hereditary Deforming Chondrodysplasia—Multiple Cartilaginous Exostoses." The condition thus described covers a large group of cases the characteristics of which are briefly as follows. It is an affection of the period of skeletal growth which is first noted usually in infancy or childhood the manifestations increasing with skeletal growth and ceasing with skeletal maturity. The lesions consisting of cartilaginous and osteocartilaginous growths with in and on the skeleton are multiple and more or less symmetrical and result from a disturbance in the proliferation and ossifications of the bone forming cartilage. Certain typical distortions and deformities of the skeleton occur and in the majority of the cases studied the ulna and the fibula were disproportionately short in relation to the radius and tibia with resulting deformities of the hands and feet. The fingers and toes showed bulbous juxta epiphyseal enlargement with frequent irregularity as to length. The condition is apparently generally symmetrical with minor differences only for out of the more than 600

August 8 1918 During the interval she had been pregnant and had been delivered 14 months before The kidneys had caused further trouble during this pregnancy but its exact type was unknown The child was ill for some time after birth The patient when pregnant for the third time (7 months) came to the clinic because of general lassitude and swelling of the legs The urine contained albumin 3 and pus cells from 2 to 4 The systolic blood pressure was 150 and the diastolic 90 the excretion of phenolsulphonaphthalein was 40 per cent The patient returned home and went through normal labor She returned again to the clinic November 22 1920 In the meantime she had been pregnant for a fourth time and except for moderate oedema of the feet was well until her labor in July 1920 About 40 hours after delivery she had had three convulsions and following this felt fairly well Her physician told her however that there was considerable albumin in the urine and that her blood pressure was high On admission the systolic blood pressure was 195 and the diastolic 135 the excretion of phenol sulphonephthalein was reduced to 20 per cent while the urine contained albumin 4 blood cells 1 and pus from 2 to 3 but no casts The blood urea ranged from 88 to 128 milligrams for each 100 cubic centimeters The culture of the urine showed staphylococcus and bacillus coli but a second cystoscopic examination did not reveal a local lesion

Renal function became progressively worse the blood urea ranging from 344 to 422 milligrams for each 100 cubic centimeters and the blood creatinin from 20 to 23 milligrams for each 100 cubic centimeters The pyuria persisted changes were observed in the fundus and secondary anaemia appeared The patient died July 4 1921 Necropsy revealed advanced chronic glomerulonephritis and bilateral hydronephrosis ascites bilateral hydrothorax anasarca oedema of the intestinal wall massive oedema of the lungs with early bronchopneumonia subacute fibrous pericarditis and moderate myocardial hypertrophy and dilatation

This case is somewhat atypical in two respects first the added presence of pyuria and infection with bacillus coli and second the presence of an infection at the onset of pregnancy The more usual course is the persistence of the acute glomerular type without improvement and with gradual impairment of renal function The distinction between ordinary nephritis and pyelitis or pyelonephritis is usually quite sharp but sometimes as in this case certain elements of each are combined

CHRONIC FOCAL NEPHRITIS

According to Volhard focal nephritis is caused by pathological changes in the kidney

which are not sufficient to encroach on the margin of safety and lower renal function and which are clinically unaccompanied by such general symptoms as hypertension or oedema

No cases of acute focal nephritis were noted in this series Such cases would present all human casts and perhaps blood cells in the urine without general symptoms or signs of more extensive renal damage or disturbance of renal function

Ten cases were called chronic focal nephritis because only the urinary findings of nephritis were present renal function being normal and hypertension or cardiac hypertrophy and oedema being absent

However in eight of these ten cases there was a history of oedema during the onset in pregnancy and although no definite history of hypertension could be obtained it is probable that these cases were originally of the same group as the acute glomerulonephritic type but had recovered to such an extent that only a focal residue persisted Examination of the fundus was negative in six of these patients while in one there were signs of old retinitis

CASE 6 A woman aged 26 came to the clinic September 30 1920 complaining of backache and dysmenorrhoea Four years before during her first pregnancy she had suffered from general oedema with albuminuria and had given birth to a dead child Three years before admission during her second pregnancy this trouble recurred but the child was normal Since that time the ankles had swollen a little in the afternoons On the whole her health had been good The urine contained albumin from 2 to 3 and an occasional pus cell and blood cell The blood pressure fundi and renal function were normal A year later she returned again to the clinic on account of dysmenorrhoea and her renal condition was apparently unchanged

CHRONIC NEPHRITIS (UNCLASSIFIED)

Seven cases were placed in this group largely because the patients were not available for a long enough study to make an exact classification possible Hence this group does not argue against the accuracy of Volhard's grouping The average systolic blood pressure in these cases was 174 and the average diastolic 115 The phenolsulphonaphthalein tests averaged 31 per cent in twelve readings and the blood urea 4 milligrams for



Fig 1

Fig 2

Fig 3

Fig 10

Fig 1 Front view of patient with weight borne on left or sound leg

Fig 2 Side view both feet on the ground

Fig 3 Side view of patient with weight borne on left or sound leg

Fig 10 Lateral view of patient fitted with raised shoe

stroyed or the region of the nutrient artery injected with alcohol and any bone changes followed with the roentgenogram and microscope. The results were positive in two animals and led Bentzen to the following conclusions:

1. Ollier's disease may be interpreted as the typical reaction of the bones against an active hyperemia of the bone tissue arising owing to anomalies in the vegetative nervous system that is disorders in the innervation of their blood vessels. (The anomaly in the second dorsal vertebra is discussed as to its possible relation to a sympathetic lesion at that level.)

2. The pathological processes in the bony tissue may be assumed to be related to the phenomena seen in the formation of callus.

White has observed two cases which he calls Hereditary Deforming Chondrodysplasia both of which had multiple cartilaginous exostoses. The condition was apparently of the symmetrical type in both cases.

Voorhoeve of Amsterdam has published an account of a condition which he believes is to be classed as dyschondroplasia and which was present in a rather marked and symmetrical degree in a brother and sister and to a lesser extent in the father the mother being

In the four cases which we have placed in this group one was malignant in the sense of Volhard while three were of the type described by Wagener and Keith

Predisposing factors in these cases were convulsive toxæmia of pregnancy typhoid fever and a dead fetus in the uterus In two there was slight œdema of cardiac origin The average systolic blood pressure was 201 and the diastolic 127 of twenty seven readings Pathological changes were found in the fundi in three cases, the fourth was not examined The renal function was good in three cases and poor in the fourth

CASE 8 (Renal type of malignant hypertension) A woman aged 46 entered the clinic May 5 1922 because of œdema and dyspnœa Eighteen years before during her first pregnancy she had suffered from toxæmia with seven convulsions and her physician had found albumin and casts in her urine most of the time since She had also had much trouble with severe headaches nausea and vomiting There were two more uneventful pregnancies following the first and she got along fairly well until the spring of 1910 when she had influenza and bronchopneumonia Following this a certain amount of dyspnœa and slight œdema appeared In January 1921 she suffered from severe vomiting attacks followed by marked dyspnœa and orthopnea together with occasional attacks of precordial pain On admission she was very dyspnoic and showed considerable cyanosis marked anasarca ascites and pulmonary congestion The heart extended to the axilla and the blood pressure throughout remained about 240 systolic and 110 diastolic The fundi showed marked arterial changes with numerous exudates and a few small hemorrhages The urine contained albumin but no casts and only an occasional erythrocyte The phenolsulphonephthalein test showed no excretion of the dye while the blood urea varied from 130 to 170 milligram for each 100 cubic centimeters and the blood creatinin from 8.6 to 8.8 milligrams There was a rather marked secondary anemia Hemoglobin was 55 per cent and the erythrocytes numbered 2,740,000 The œdema and dyspnœa almost entirely disappeared with a Karez diet digitals and diuretin The patient returned home but later the dyspnœa and œdema returned and she died about two and one half months afterward

The differential diagnosis in this case of long standing glomerulonephritis following toxæmia and chronic hypertension with terminal nephritis is difficult to make here in the absence of postmortem examination We have tentatively placed it in the group of malignant hypertension because of the long period of

freedom from serious trouble, with the development of marked hypertension and retinitis with poor renal function and the predominantly cardiac nature of her terminal dyspnœa and anasarca

CASE 9 (Diffuse vascular type of malignant hypertension) A woman aged 38 came to the clinic July 4 1922 because of the high blood pressure She had seven children living and well With each of her pregnancies there had been œdema of the legs but no other symptoms In the summer of 1921 a dead fetus was retained for 4 months and was delivered naturally at the eighth month Since that time she had never regained her usual strength She had been subject to migraine all her life but after her last delivery the symptoms became more severe and almost continuous In the late spring of 1922 she consulted an ophthalmologist for failing vision which had been coming on for 5 or 6 years He told her she was suffering from retinitis and sent her to a physician who found the blood pressure increased Since then the systolic pressure has varied between 180 and 200 in spite of the use of nitrates and iodides On her admission the heart was moderately hypertrophied and the peripheral arteries thickened while the vascular changes of hypertension with a few hemorrhages and one exudate were evident in the fundi The systolic blood pressure on admission was 40 and the diastolic 10 With rest and nitrates they were reduced to 150 and 90 The blood urea the phenolsulphonephthalein the water and concentration tests were negative There was pus in the urine and the culture of the urine for bacillus coli was positive Two and one half years later she reports fair health

TIME OF ONSET OF NEPHRITIS IN PREGNANCY

Other points of interest have been raised in the literature on which our statistics have some bearing Primiparas are supposed to be particularly predisposed to the nephropathy of pregnancy Our statistics show the number of pregnancies as follows I para 32 II para, 7 III para 5 IV para 4 V para 2 VI VII X and XI para one each, and none for XII and XIII para

In two cases the disease antedated pregnancy but was aggravated by it In this connection the numerical preponderance of primiparas over multiparas must also be taken into consideration

The time in relation to pregnancy when the onset of symptoms appeared is given in cases in which it could be ascertained before pregnancy 2 cases first month none second month, 3, third month none fourth month 4 fifth

Very recently Fairbank has reported "A Case of Unilateral Affection of the Skeleton of Unknown Origin" in a boy 12 years of age which he does not believe can be classified under the heading of chondrodysplasia but which on reading the description and seeing the published roentgenograms is inclined to place in that class. The condition was confined to the right side of the body and the right leg was one half inch longer than the left a finding which is used as an argument against the diagnosis of chondrodysplasia as all reported cases of that condition show shortening of the affected extremities. The roentgen appearance is that of atrophy striation and a sprinkling of dense spots with no alteration in the contour of the affected bones.

Jansen has just reported a case of 'Unilateral Chondromatosis (Ollier's Disease)' in a 9 year-old girl. The left side of the body was involved but a few suspicious areas were also seen in the roentgenograms of the right side. The face was asymmetrical but no lesion of the sympathetic system could be demonstrated. Pathological tissue showed cartilaginous masses with bone marrow and blood vessels in the center. No fibrous tissue was found.

The author's case which led to the search of the literature the results of which are briefly summarized above follows:

A girl aged 11 years came into the hospital the complaint being that the right leg was markedly shorter than the left. This shortening had been present since birth and the doctor who saw the child at that time said it was probably due to maldevelopment. The family history was negative and no similar condition had ever been present in any of the members of the father's or mother's families immediate or remote. The patient had the usual diseases of childhood with no complications.

Examination at the time of admission showed a marked shortening of the right lower extremity with enlargements at the lower and upper ends of the tibia and the lower end of the femur and a palpable mass on the medial side of the shaft of the femur. The enlargements were hard and firm and felt like definite tumor masses. There was a marked varus deformity of the knee and a permanent flexion deformity of about 15 degrees was present in this joint (Figs 1 & 2). Measurements showed approximately 20 centimeters shortening of the right lower extremity as compared with the left the measurements being taken from the anterior superior spines to the medial malleoli. There was a marked shorten-

ing of the second toe of the right foot but no other apparent lesion below the ankle. The ankle joint was apparently normal and the knee joint showed practically a normal range of motion.

A roentgen study of the skeleton disclosed a peculiar condition present, most prominently in the right ilium femur tibia and second metatarsal bone of the foot. The upper extremities and spine were apparently negative. The right ilium showed in its wing a vacuolated area with increase in density around it and rarefied areas above the acetabulum. The pubic bone showed slight similar changes. The right femur was much shorter and thicker than normal and two large tumor masses were present one apparently originating from the shaft near its center and causing distortion with a smoothly surfaced although slightly irregular vacuolated mass projecting medially and the other occupying the lower end of the bone and causing an asymmetrical swelling with intact outline but showing in its body a very striking mottled appearance (Figs 4 & 5).

The upper and lower ends of the right tibia showed swellings similar to that in the lower end of the femur (Figs 5 & 6). The fibula was apparently not involved and as a consequence was very long in comparison to the shortened and thickened tibia. The first and second metatarsal bones of the right foot and the phalanges of the great and second toes and to a lesser extent of the other toes were involved and showed a series of vacuolated areas with dense striations in and around them (Fig 8). The shortening of the second toe was seen to be due to the condition in the second metatarsal bone. The left femur showed a slight thickening and spindle like enlargement in its middle (Fig 9) and the upper end of the shaft and the neck showed definite rarefied areas with no tumor formation (Fig 4).

A biopsy was performed and a portion of the tumor mass in the upper end of the tibia was removed. Grossly the mass was cartilaginous with a thin bony shell. The microscopic sections showed mainly cartilage with small areas of bone distributed throughout. There was also well developed fatty bone marrow with areas of red bone marrow. A diagnosis of chondrodysplasia with the formation of osteochondroma was made the benign character of the lesion being assumed (Dr E. T. Bell). No treatment seemed to be indicated so the child was fitted with an extension sole on the shoe which made up for the shortening (Fig 10).

A study of the roentgenograms of this case together with the findings in the literature, which have been outlined above seemed to make the diagnosis of chondrodysplasia fairly certain. It seems impossible to separate absolutely the various types of cartilaginous tumors and dysplasias from each other and undoubtedly they are all related in a certain way and it is therefore questionable whether the asymmetrical cases should be classified as

larly true of the group of chronic glomerulonephritis

TABLE III—END RESULTS OF NEPHRITIS OF PREGNANCY

Diagnosis	Number Cases reported	Health				
		Good	Fair	Poor	Dead	Living
Acute glomerulonephritis	12	8	4	2	1	1
Acute nephrosis	2	2	1	1		
Acute nephritis (unclassified)	1	1	1			
Chronic focal nephritis	10	4	3	1		
Chronic glomerulonephritis	12	12		5	2	5
Benign hypertension	9	7	2	2	2	1
Malignant hypertension	4	3		1	1	1
Chronic nephritis (unclassified)	7	4	1		1	2
Total	57	41	12	12	7	10

DISCUSSION

We have shown that the nephropathy of pregnancy and its sequelæ can be classified clinically into the same groups as that of the ordinary type of nephritis. We have disregarded so called true eclampsia in which at necropsy pathological change is found only in the liver if at all. Harns has recently reviewed 177 cases of toxæmia of pregnancy from the Johns Hopkins Hospital. Fourteen of the patients died and of the remainder 111 returned for further study at the end of one year. The condition was classified into three groups: eclamptic toxæmia, pre-eclamptic toxæmia and nephritic toxæmia. Of twenty-seven patients with eclampsia seen a year later three had chronic nephritis. Of 55 patients with pre-eclamptic toxæmia 60 per cent suffered from chronic nephritis the following year and all of the 30 patients whose cases were diagnosed as nephritic toxæmia now suffer from chronic nephritis. The larger percentage of residual chronic nephritis in all three groups suggests that the classification is more or less of an arbitrary one and that the fundamental process in all groups is similar.

The more modern tendency seems to be to consider nephritis as a systemic disease rather than as one limited exclusively to the kidneys. No plausible explanation of the symptoms of œdema and hypertension has been advanced when only pathological changes in the kidney have been considered but when extensive lesions of the smaller blood vessels, capillaries,

or general body tissues are postulated these phenomena become much more understandable.

The vascular changes can be demonstrated clinically in the small vessels of the eye and by direct capillaroscopy in the nail fold. Brown and Roth have called attention to a possible toxic lesion of the bone marrow that causes anæmia. Dunn and McNee have shown similar lesions about the vessels of the brain and spleen. With such a widespread vascular involvement it is no wonder that the small vessels and capillary tufts of the glomeruli are seriously damaged and it is in the kidney especially that such damage has disastrous effects on renal function. Similar vascular injury in the liver would pass unnoticed because of the wide margin of safety which must be overcome before symptoms of hepatic insufficiency are manifest and because of its marked power of regeneration. Perhaps some of the more modern tests of hepatic function will reveal evidence of hepatic damage in nephritis.

A similar state of affairs apparently exists in the toxæmias of pregnancy. Hinselmann has recently shown that in eclampsia capillaroscopy reveals capillary changes which gradually return to normal in the course of several months but that if chronic nephritis develops these changes are more marked and permanent. These observations were later confirmed by Nevermann, Baer and Reis, Linzenmeier and Hinselmann, Nette, Loven and Silberbach. The last mentioned authors found changes in capillary circulation in 80 per cent of twenty-five cases of eclampsia; they consisted of structural changes and alteration of flow. Baer found normal capillaries in normal pregnancies. The presence of œdema, hypertension and abnormalities in the eye grounds, as well as renal changes, illustrates the diffuse nature of the process. Cheney has recently reviewed the literature and discussed the incidence of reinitis in the toxæmias of pregnancy.

If we assume the existence of a diffuse toxin that attacks the vascular system which in nephritis seems to be often bacterial in origin we can postulate different degrees of damage, depending on the potency of the

VARIX OF THE SUPERFICIAL EPIGASTRIC VEIN SIMULATING FEMORAL HERNIA

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CONFUSION in the differential diagnosis between varices in the femoral triangle and actual femoral hernia is a matter of fairly common occurrence. Numerous reports of clinical cases appear in the literature, some of which have been diagnosed before operation and others not. A case is presented which is apparently unique in that the varix was of the superficial epigastric vein rather than of the saphenous. This fact may also account for the absence of some of the usual diagnostic signs of the condition.

The recognition of varices in the region of the femoral triangle according to de Quervain should present no particular difficulty. Though referring to dilatation of the internal saphenous alone he says: "Fusiform or sacular dilatation of the vein disappears at the least pressure and reappears the moment the pressure ceases. Besides the least variation of intravenous pressure such as that caused by coughing and changes of position of the body causes variation in the volume of the tumor; the bluish color of the blood sometimes shows through the skin. The signs are so clear it would seem impossible to make an error in diagnosis. It has however already been done!"

Coley lists the diagnostic signs as follows:

1. Instead of suggesting a solid body on palpation it has a peculiar thrill as if fluid were being forced through a compressible tube.
2. If the tumor is reduced and fingers pressed over the femoral opening and tumor slowly reforms it is a saphenous varix.
3. In nearly every case there are well marked varicose veins.

These general points are emphasized also by Cooper, Mall, Stetten, Noehren, Sistrunk, Erdman and others who have reported cases and discussed the diagnosis. Several instances of incorrect diagnosis of femoral hernia of which the present case is one are in the literature, the condition being recognized only at operation.

CASE 1. M. H. S., white female, married, age 51 years, complained of a lump in the left groin.

Past history: Appendectomy in 1908 was followed by ventral hernia. Repair of ventral hernia was made in 1922 and again in 1923. The patient has had 4 pregnancies, a miscarriage occurring each time.

Present illness: Six years ago the patient first noticed a small lump in her left groin. This has slowly increased in size, but most rapidly during the past year. The swelling is barely noticeable while the patient is lying down but becomes larger when she is standing or walking. She has not noticed any increase in size on coughing. For the past year the patient has felt a dull aching pain in the region of the swelling. This pain does not radiate and is more severe when the patient is standing up. There has never been any evidence of inflammation about the swelling.

Physical examination: The patient is a rather obese white woman. Examination is essentially negative except for the scar of a right rectus incision (hernia repair), a few dilated veins over the lower part of the abdomen, and the local condition. In the left femoral region can be palpated a small soft mass about 4 centimeters in diameter, easily compressible. An impulse is felt on coughing. In the erect position the mass increases somewhat in size and extends further toward the median line. There is no discoloration of the tissues. Extremities are normal.

Diagnosis: Femoral hernia, reducible.

At operation May 16, 1925, the usual incision was made and carried down through a thick layer of subcutaneous fat. As the tumor was approached it was seen to be of a purplish color. Particular care was taken in dissecting it and prompt recognition of its character made. At about 1 centimeter from its entrance into the saphenous vein, which was entirely normal, the superficial epigastric vein was found to be greatly dilated. This varix measured about 4 by 6 centimeters, the upper pole lying just below Poupart's ligament where the vein pursued its normal course though still about 3 times its normal size and markedly sclerotic. When emptied the varix was found to fill very slowly from above and rapidly from below; the walls were thin and there was no evidence of thrombosis. Proximal and distal ligatures were applied and the varix excised. There was no sign whatever of a femoral hernia.

Healing was prompt and the patient made an uneventful post-operative recovery. There was no indication of tumor on discharge.

The diagnosis in this case was undoubtedly obscured by the particular position of the varix (Fig. 1). Reduction of the tumor and

VOLVULUS OF THE CÆCUM

REPORT OF A CASE COMPLICATING TYPHOID

BY HENRY FLACK GRAHAM MD FACS BROOKLYN New York

VOLVULUS of the cæcum is of sufficient rarity to justify the publication of all undoubted cases. The developmental anomaly that causes it together with its dramatic onset and unusual interest at the time of operation all join in placing it a little outside the common run of surgical work.

In 1898 von Manteuffel collected 24 cases in 1902 Faltin increased this number to 79 and in 1913 the number was raised by Bundschuh to 110. Bundschuh did not include five of Faltin's cases since they were associated with incarcerated hernia or invagination. A few others were not included among them cases published by Corner and Sargent. A number of cases have been reported since 1913 those by Beeger, Jacobsen, Homans and Ohman being among the more recent.

It is generally conceded that a mobile cæcum is necessary to the production of volvulus. This anomaly of development is described by Gray as follows:

After the third month of fetal life the lower arm of the umbilical loop which becomes the cæcum and colon begins to pass over the upper arm which later becomes the duodenum and small intestine.

The cæcum which has already developed an appendix thus comes to lie up under the liver. The cæcum increases in length and finding least resistance below finally settles in the right iliac fossa dragging down a short ascending colon. The mesentery of the cæcum and ascending colon usually disappears and fusion of the posterior wall of the colon to the posterior abdominal wall takes place. Occasionally however the cæcum and ascending colon retain a more or less distinct mesentery.

In speaking of volvulus Moynihan says: The sigmoid flexure is most commonly affected but the ileum, jejunum or cæcum may also be separately or conjointly involved.

In the majority of cases some anatomical abnormality is the determining factor—such as the cæcum and ascending colon suspended

by a mesentery continuous with the mesentery of the small intestine.

Von Thun states that in the infant mobile cæcum is sometimes due to a retardation in development in elderly persons to a general feebleness of the organs and in the adult to a sort of arrest of development or as mentioned by Rossing to general enteroptosis.

In addition to the anatomical abnormality mentioned by most authors Corner and Sargent discuss in some detail what they call an acquired volvulus. This they consider to be present in rotation of the cæcum on its long axis. The cæcum in fetal form is tapered. It takes on at times however a pouched form and this form when distended or subject to contraction of the abdominal muscles is very liable to twist.

Other predisposing causes are:

- 1 Old scar formation and chronic mesenteritis (Philipowicz, Kuettner, Robinson).
- 2 Former operation (Whiting, Riedel, Huebner, Schultze, Robinson, Shepard).
- 3 Hernia (Rokitansky, Vaughan).
- 4 Fibrous bands (Tesson).
- 5 Mesenteric cysts (Huebner, Fertig).
- 6 Habitual constipation and chronic intestinal stasis with traction on mesentery (Bosquette, Delore).

Faltin who found a higher proportion of cases in Finland and Russia believed the dietary customs of these two countries to be a predisposing factor. The vegetable diet of the Russians together with the great number of fast days (120) bring about dilatation and atony while in Finland the diet consisting mostly of potatoes and sour bread, is in the same category.

The rotation of the intestine is of three types:

I Circular rotation with one fixed point. The mesentery is common to the whole of the small intestine, the cæcum and part of the colon. The root of the mesentery is thus much smaller and less widely spread. The axis may

SURGICAL MANAGEMENT OF THE ACUTE ABDOMEN¹

BY W. M. THOMPSON, M.D., F.A.C.S., CHICAGO

THE title acute abdomen was first used by W. H. Battle in 1911 as a substitute for the more prophylactic conditions within the abdomen or the less definitely descriptive acute abdominal crises. Since then because of its brevity and terseness it has been given the stamp of approval by the surgeons who have written upon this condition.

As an introduction to my subject the surgical management of the acute abdomen I will review briefly the causes together with their results.

Of all the definitions of the acute non-traumatic abdomen that of Deaver appears to be the most satisfactory. He says it is a sudden onset of acute abdominal pain preceded or followed by nausea or vomiting or both with tenderness and rigidity over the whole abdomen as a rule but more pronounced over the most painful area which is suggestive of the site of the lesion with or without depression or shock.

The acute surgical abdomen is divided into non-traumatic and traumatic. The causes of acute non-traumatic abdomen are:

- 1 Infections
 - Appendicitis
 - Acute cholecystitis
 - Pyosalpingitis
- 2 Inflammatory lesions
 - Perforating ulcer
 - Duodenal
 - Cancer
 - Typhoid
- 3 Misplacements, torsions, and abnormal conditions resulting in intestinal obstruction
 - Bands
 - Postoperative adhesions
 - Ovary
 - Tumors
 - Spleen
 - Meenteric thrombosis

- 4 Rupture
 - Intestine
 - Pancreas hemorrhagic pancreatitis
 - Ectopic pregnancy
 - Spleen
 - Uterus
- 5 Hernias incarcerated
 - Abdominal
 - Inguinal
 - Internal
 - Postoperative

The crisis of the acute abdomen may be the dissemination into the abdominal cavity of fluid (1) either blood or cystic contents of the contents of the stomach and upper intestinal tract at first relatively sterile but not long remaining so (2) pus from the appendix and fallopian tubes (3) infected bile or pus from the gall bladder (4) the contents of the lower intestinal tract which increases in degree of infection as we progress downward.

The acute abdomen in infancy and childhood needs special mention because abdominal pain in children does not at first excite any special alarm hence children are often neglected. The diagnosis requires a combination of objective findings and a certain amount of intuition. Abscesses in children are less likely to be walled off. The omentum is smaller than in the adult and cannot act as easily as a dam against infection. Children do not usually stand operation as well as adults but they generally show good powers of recovery. Abscesses in fat or robust children are usually of the fulminating type.

In infancy and childhood the chief cause of acute abdomen are:

- 1 Acute appendicitis
- Intussusception
- 3 Pneumococcal peritonitis a rare disease usually found in the female

The traumatic abdomen may be divided into those which present evidence of internal injury and those which do not.

detorsion If the greater part of the small intestine is involved in the volvulus, detorsion alone can be performed since resection would be impossible Beeger has outlined his treatment as follows light attacks detorsion medium attacks detorsion resection of the gangrenous portions entero anastomosis, difficult cases detorsion and enterostomy

Detorsion with fixation of the cæcum mentioned by Faltin is according to Beeger no longer employed Faltin stated that if fixation were not employed there was apt to be a recurrence and that there were some cases on record where a patient had had two or more operations for volvulus Hartung on the other hand considers it as required in all cases where resection does not follow detorsion Jacobsen recommends it if needed Tanner employed it to good effect in his own case

Bundschuh has tabulated the results of treatment in his 110 cases with the following results

Of 23 patients not operated upon all died

Of 87 patients operated upon 35 (40 per cent) recovered 52 died

Of 15 patients operated upon no detorsion was performed all died (In some enterostomy typhlostomy or anus præternaturalis)

In 40 cases operation consisted only of detorsion and separation of adhesions and 26 patients recovered (64 per cent)

In 1 case appendectomy was performed after detorsion death resulted

In 9 cases intestinal fistulae were employed after the detorsion (7 typhlostomies 1 ileostomy 1 appendicostomy) all patients died

In 4 cases typhlostomy was employed 2 days after the detorsion 3 recoveries

Partial resection of the gangrenous part of the intestine was made in three cases all died

Total resection of the involved part of the intestine was made in 15 cases 7 recoveries (47 per cent)

There was thus 100 per cent fatality when no detorsion was attempted

Simple detorsion of the volvulus sufficed in the cases in which early operation was possible or in which there had not been an acute course 1 e in which the intestine showed little injury 36 per cent mortality in these

cases seems to Bundschuh to be high The cause of death was frequently collapse once pneumonia often peritonitis The prognosis following detorsion and enterostomy was very poor All 10 patients who had primary enterostomies died some in collapse 1 of pneumonia, and 6 of peritonitis Resection of the entire twisted section of intestine gave a much better prognosis (47 per cent recovered) though these were the poorest cases all showing signs of gangrene and some of poor general condition Of these cases five died in collapse two of pneumonia and one apparently of peritonitis

The conclusion is that in cases in which the intestine is in good condition detorsion with caecopexy if necessary is sufficient In cases of gangrene complete resection is indicated unless a very large portion of the small intestine is involved If immediate resection cannot be undertaken the entire twisted loop should be brought forward and resected when the patient has improved

Enterostomy anus præternaturalis or suture of the appendix in the abdominal wall and opening of it is inadvisable if there is a possibility of gangrene since in these cases perforation peritonitis cannot be prevented

The general mortality in operative cases was 52.5 per cent in Corner and Sargent's compilation without operation it was 66 per cent In Beeger's 69 cases operated upon the mortality was 53.6 per cent and in Faltin's 79 operative cases it was 64 per cent

My own case the report of which follows is unique in that the volvulus was a complication of typhoid No such similar case was found in the literature consulted

J. W. age 44 Hosp. No. 13616 service of Dr T. C. Guenther Patient was admitted to Norwegian Hospital December 31, 1924 with a history of illness lasting 2 weeks The chief symptoms had been headache malaise and epistaxis at the onset His temperature on admission was 104 degrees pulse 100 respirations 20 A blood count showed red cells 3,400,000 hæmoglobin 63 per cent polynuclears 65 per cent small lymphocytes 28 per cent large lymphocytes 7 per cent The Widal reaction was positive The urine showed a trace of albumin Physical examination showed rose spots slight abdominal distention and an enlargement of liver and spleen both of which were palpable

On January 5, 1925 there was impaired resonance over the upper left lung and rales were heard

recovered in the thoracic duct but much slower and in a smaller quantity than through a urethral fistula. Laboratory experiments are helpful in so far as they demonstrate the absorbing power of the peritoneum but no worker has been able to reproduce the pathology and the septic fluid found in the acute abdomen.

It has recently been shown that fluids are absorbed with equal rapidity from all parts of the peritoneal cavity which is contrary to the conception of former physiologists who believed that the greater absorption took place in the region of the diaphragm. The movements of the diaphragm may increase the rate of absorption in that region but the capacity to absorb is equal over all the peritoneum. In the early stages of rupture of an abscess, absorption is hastened. As soon as hyperæmia and inflammatory exudate appear together with damaged endothelium absorption is delayed. Wagner found that increase in abdominal pressure hastened absorption as long as increased pressure is not great enough to retard the flow of blood. The factors which delay absorption are drugs such as opium or albumin added to the abdominal fluids or in solution. A profuse peritoneal exudate is no good omen for the patient. In the intraperitoneal conditions in which intra abdominal pressure is increased as for instance tympanites in peritonitis if the pressure is sufficient to check the circulation within the abdomen caution should be used in reducing the intra abdominal pressure, for tympany here is a conservative factor. If too free incisions through the abdominal wall relieve this pressure undesirable absorption is increased. It goes without saying that unwise manipulation increases absorption. In the stage of contamination of the peritoneum there are three possibilities to be considered:

1. Material may be introduced in such quantities that death by intoxication may result before the defensive functions of the peritoneum can be mobilized. Thus we have the possibility of death by absorption of toxins before the reactive factors could be set into action, that is before peritonitis could develop.

2. Small doses of bacteria might be destroyed before they could do harm.

3. Stagnating fluids in the peritoneal cavity would favor the development of bacteria. Thus the amount of infectious material the kind of bacteria and the state of preparedness of the peritoneum are the important factors. In the presence of these conditions there is no surgical procedure that demands more highly trained and coordinated assistants.

Local anaesthesia should be chosen for the first stage for the infiltration of the abdominal wall and blocking of the lower thoracic and abdominal nerves, procaine and adrenalin being used. In an encysted abscess it is possible to cofferdam the abdominal contents from the abscess evacuate the abscess by suction and infiltrate the mesentery of the caecum in appendicitis or do a subperitoneal infiltration in the region of the splanchnic nerves in duodenal or gastric ulcer. Successful intra abdominal anaesthesia depends upon negative intra abdominal pressure and this is not always possible in the face of an invading infection so that it is often best to resort to gas oxygen analgesia while adhesion are being removed. In the stage of peritoneal reaction before sufficient intraperitoneal pressure has developed to delay absorption local anaesthesia may suffice.

If material in sufficient quantities has been introduced into the peritoneal cavity to cause death by intoxication gas oxygen with a small percentage of ether may be the anaesthetic of choice. In those cases in which vomiting is a troublesome symptom it is advisable to wash out the stomach and in patients in whom the contents of the small intestine are liable to continue to regurgitate, the stomach tube may be left in for further emptying and lavage. Acidosis and blood concentration can be prevented by hypotonic solutions introduced subcutaneously or intravenously. The rectal injection of water or normal salt solution may stimulate peristalsis a condition to be avoided and it has been found that hypodermoclysis can be maintained for sufficient length of time to saturate the tissue. It is also to be borne in mind that this tissue saturation may slow up absorption.

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The importance of the veins is illustrated by the 'caput medusæ' of portal obstruction. It is abundantly drained by lymphatics and although the direction of drainage is mostly from it there is little doubt but that in pathological conditions these become obstructed and the flow reversed in the same manner as is that of the veins. Pathologically the lymphatics are of importance in the occurrence of metastatic carcinoma at this site and also in accounting for the discoloration of the umbilicus in intraperitoneal hæmorrhage.

In 1916 Cullen collected from the literature 91 cases of carcinoma of the umbilicus. Of the 75 primary growths 3 were squamous cell epitheliomata and 2 adenocarcinomata having their origin in remnants of the omphalomesenteric duct. Of the secondary group in 27 instances the original growth was in the stomach in 5 in the gall bladder in 5 in the intestine in 10 in the ovary and in 4 in the uterus. In 21 instances the site of the primary tumor was not determined.

Since the publication of Cullen's book 3 cases have been reported: 1 case by Wohl of cancer of the umbilicus secondary to cancer of the transverse colon and 2 cases by Warner in one of which the original growth was in the stomach and in the other in the rectum. Counting the author's case the figures at present are as follows:

Primary squamous cell epitheliomata	3
Primary adenocarcinomata	2
Secondary to cancer of the stomach	23
Secondary to cancer of the gall bladder	5
Secondary to cancer of the intestines	8
Secondary to cancer of the ovary	10
Secondary to cancer of the uterus	4
Site of primary growth not determined	21
	101

In the cases secondary to cancer of the bowel the site of the primary lesion was as follows:

Rectum	3
Transverse colon	3
Cæcum	1
Verrily all of large intestine	1
	8

The manner in which the malignant cells reach the umbilicus is of considerable interest. Usually it is by way of the lymphatics but in 5 cases secondary to carcinoma of the

stomach and in 1 case secondary to carcinoma of the transverse colon the primary growth had become adherent to the peritoneal surface of the navel and had ulcerated through with the formation of a gastro umbilical or colo umbilical fistula. In several instances the tumor originated from a secondary nodule in the omentum which had become adherent in the sac of an umbilical hernia.

The usual route of extension is however via the lymphatics. These are divided into three sets: the superficial running in the subcutaneous fat to the axillary and inguinal glands; the preperitoneal running in the preperitoneal tissue to the deep inguinal glands; and the peritoneal draining also into the deep inguinal glands and upward through the diaphragm into the parasternal chains. There is a separate channel running along the round ligament of the liver.

Were the normal lymphatic stream toward rather than away from the navel umbilical carcinoma secondary to carcinoma of the viscera would doubtless be more common. As it is it is probable that for cells to arrive there the normal stream must be obstructed and the flow reversed. This is doubtless the reason that it is most often secondary to cancer of the stomach and ovary malignancies which metastasize early and extensively to the peritoneum and in the case of the former to the liver. In carcinoma of the stomach and intestines metastasis is usually by way of the round ligament and is secondary to nodules in the liver. In cancer of the gall bladder extension by the same route is obvious. Some writers suggest that metastasis may even be retrograde from the inguinal glands. In pelvic conditions this is not beyond the possible.

PATHOLOGY

The umbilical growths may vary in size from small subepithelial or epithelial nodules to large ulcerated tumors. The smallest growth observed was but a few millimeters in diameter while the largest was the size of a child's head. The size and degree of ulceration depend of course upon the duration.

When the involvement is by direct extension from the stomach or intestine, the

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THE NON-SPECIFIC ANTIGENIC EFFECT OF SPERMATOZOA UPON FERTILITY¹

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THE purpose of these experiments was to determine if possible a serological explanation for sterility in the human which had no apparent anatomical or physiological basis. Dittler Kovacs McCartney and others report temporary induction of sterility in rats by sensitization with rat spermatozoa. Waldstein and Flier describe in rabbits a definite Abderhalden reaction to testicular protein following coitus.

Our object was to produce these antibodies experimentally in animals to note their effect on a known existing fertility and later to determine whether a similar sensitization to spermatozoa protein existed as a possible causative factor in human sterility. In addition we wished to determine

1. Whether this effect were specific for species that is whether female animals sensitized by perm of another species would give the same results as those sensitized by spermatozoa of the same species

2. Whether ovulation was effected by this sensitization

3. What mechanism caused this sterility precipitins agglutinins lysins or spermatoxins

4. What was the effect of sensitization upon females already pregnant

TECHNIQUE

Female albino rats of the same family were used to eliminate familial variation. They were all about 100 days old and had already borne one litter thus establishing their fecundity. A diet sufficient in vitamins was supplied as it has been proved that a deficiency of vitamins can readily induce relative sterility. (6) The rats were kept warm in clean cages and supplied a varied diet of milk green vegetables and table scraps. Long and Evans method of determining the presence of oestral cycle was used (20).

When a female was found pregnant for the first time it was isolated until delivery of the initial litter and 10 days later at 4 day intervals was injected intramuscularly with 100,000, 200,000 and 300,000 spermatozoa. Two weeks after the last injection active young males were put into the cages with the sensitized females and allowed to stay there continuously. Vaginal scrapings of these female rats were examined at regular intervals for the presence of oestral changes care

CHONDRODYSPLASIA¹

By WALLACE H. COLE, M.D., F.A.C.S., ST. PAUL, MINNESOTA

CARTILAGINOUS tumors are frequently found in the human body and of these the skeletal types are by far the most common. The classification is however far from clear because of the marked variation in both the clinical and pathological characteristics of these tumors and the allied dystrophies and probably no definite lines of demarcation will ever be distinguished. These varied features to quote Ewing are "perhaps dependent upon the facts that cartilage is essentially an embryonal and transitory tissue and that cartilage cells although encased in a firm matrix have rather active proliferative powers possess amorphous properties and are readily subject to metabolic changes. One type of case which has appeared rather infrequently in the literature is the so called chondrodysplasia or Ollier's disease and the observation of what is apparently a unique case of this condition has led to the making of the following brief report.

Ollier in 1898 reported a case of cartilaginous dystrophy in which the extremities of one side of the body were as a result markedly retarded in growth and to which he gave the name of dyschondroplasia. In 1900 Molin working under Ollier published a thesis at Lyons entitled *Dyschondroplasia* a Roentgenological and Clinical Study to which an introduction was written by Ollier and in which three cases of the condition were reported one of these being the original case of Ollier. All of these showed a typical asymmetry although in one there was a crossed distribution the right lower and the left upper extremities being involved. According to Ollier the condition is characterized by irregularity and retardation of ossification at the epiphyseal cartilage for this cartilage does not submit to the normal process of ossification but persists as cartilaginous masses and nodules which take a long time to transform themselves into bone. These nodules may be superficial or deep that is subperiosteal or medullary. The condition is observed most

clearly in the phalanges of the fingers and toes principally the former all the affected bone being sometimes involved and sometimes only a part. It is as if little chondromata were disseminated in the tissue of the phalanx. In the long bones the tumors are in the juxta epiphyseal regions and when on the surface, the more common occurrence resemble exostoses. When in the bone the juxta epiphyseal areas are transformed into transparent masses which are regularly swollen and more or less voluminous in this case the epiphysis remaining more cartilaginous than normal for the same age. The roentgenogram shows the deformed contour of the bones and the cartilaginous masses interrupted by denser white spots. Ollier's short definition of dyschondroplasia is "An affection of the period of growth with arrest of growing parts of the skeleton with nodosities and swellings of the extremities of the corresponding long bones curving of diaphyses and slight but constant deformities of the hands." He believed that the so called osteogenic exostoses and dyschondroplasia were identical. Nove Jossierand who has also studied one case of this condition mentions the 'hemiplegic' distribution as an important characteristic and differential point.

Molin's study caused him to arrive at the following conclusions:

1. Dyschondroplasia is an osseous dystrophy characterized from a clinical point of view by partial arrest of development of the skeleton.

2. The disturbance of the bony growth affects by preference the long bones of the extremities and the metacarpophalangeal skeleton of the hand.

3. The long bones show curvatures analogous to those of rickets.

4. Joint deformities must be considered as the direct consequence of bony alterations.

5. Only the roentgenograph allows the nature of the dystrophy to be observed it approaches that of rickets and chondroma but does not completely simulate them.

TABLE II—SENSITIZATION OF RATS TO GUINEA PIG SPERMATOZOA

(Results in 10 of a series of 20)

No	Initial litter		Dates of injections	Results	Interval between last injection and start of pregnancy
	Date	No			
1	6-10-24	7	6-12-24 6-15-24 6-19-24	Litter of 6 9-11-24	11 weeks
2	6-17-24	6	6-12-24 6-15-24 6-19-24	Litter of 6 9-1-24	6 weeks
3	6-22-24	7	6-19-24 7-1-24 7-5-24	Litter of 4 9-15-24	12 weeks
4	6-28-24	5	6-27-24 7-1-24 7-5-24	No preg	10 weeks
5	7-3-24	5	7-12-24 7-16-24 7-18-24	Litter of 5 10-1-24	10 weeks
6	7-11-24	6	7-12-24 7-16-24 7-18-24	Litter of 5 11-4-24	14 weeks
7	7-5-24	4	7-15-24 7-19-24 7-23-24	Litter of 4 11-11-24	7 weeks
8	9-14-24	7	9-15-24 9-19-24 9-22-24	Litter of 6 11-20-24	8 weeks
9	10-24-24	8	11-11-24 11-15-24 1-0-24	Litter of 12 12-26-24	6 week
10	11-7-24	7	11-11-24 11-15-24 11-19-24	No preg	27 week

Average of 20 rats of this series

14 weeks

TABLE III—SENSITIZATION OF RATS TO HUMAN SPERMATOZOA

(Results in 10 of a series of 20)

No	Initial litter		Dates of injections	Results	Interval between last injection and start of pregnancy
	Date	No			
1	6-10-24	7	6-12-24 6-15-24 6-19-24	Litter of 6 9-11-24	11 weeks
2	6-11-24	6	6-12-24 6-15-24 6-19-24	Litter of 6 8-1-24	6 weeks
3	6-22-24	7	6-20-24 7-1-24 7-5-24	Litter of 4 9-15-24	12 weeks
4	6-28-24	5	6-29-24 7-1-24 7-5-24	No preg	20 week
5	7-3-24	5	7-12-24 7-16-24 7-20-24	Litter of 5 10-1-24	10 weeks
6	7-11-24	6	7-12-24 7-16-24 7-20-24	Litter of 8 11-4-24	14 weeks
7	9-5-24	4	9-15-24 9-19-24 9-23-24	Litter of 4 11-21-24	7 weeks
8	9-14-24	7	9-15-24 9-19-24 9-23-24	Litter of 6 11-20-24	8 weeks
9	10-24-24	8	11-11-24 11-15-24 11-19-24	Litter of 12 12-26-24	6 weeks
10	11-7-24	7	11-11-24 11-15-24 11-19-24	No preg	29 weeks

Average of 20 rats of this series

14 weeks

that Meeker (22) reports the presence of agglutinins in the human and McCartney in rats in our experiments at no time would there be demonstrated more clumping in the specific sera than in non specific controls equally as marked clumping occurred with sera of men as with the specific sensitized sera. At no time were observed the classic agglutinins described by Lillie (19) Ioch (21) and Sampson (2) for marine forms in which the spermatozoa are clumped from a homogeneous suspension by the addition of saltwater egg extract. A marked difference was observed in results obtained with fresh sera and inactivated sera. Spermatozoa were immobilized in fresh sera in 20 minutes while after inactivation the same sera allowed the sperm to remain motile for over 2 hours. As

expected the more marked clumping occurred with inactivated sera in which the spermatozoa remained motile for a longer time. This fixation of the sperm could hardly be interpreted as due to toxins for it was as marked in the non specific controls as in the specific sensitized sera. Rottner and Kirchheim (2) observed that in individuals who had had any foreign protein therapy and also in markedly cachectic individuals sperm remained motile for hours despite the fact that their sera had not been inactivated.

In these experiments at no time were toxins found in over 200 trials. No sera would cause the actual swelling and dissolution of spermatozoa in isotonic solution despite the fact that a definite precipitin for the specific sperm had already been demonstrated. Taylor (7)

cases found in the literature by Ehrenfried, only 5 or 6 showed a marked asymmetry (Mohn's cases etc.) Hereditary relationship in this series was present in about 60 per cent of the cases. Roentgen examinations showed typically juxta epiphyseal hyperostoses particularly around the larger joints with squaring off of the bones entering into the knee joint. Enlargements at the metaphyseal ends of the bones were thin in density and mottled or striated in the younger patients but denser and with longitudinal striations in the older cases. Bubble like vacuolation suggesting cysts present particularly in the ulna radius and fibula were very characteristic. Ehrenfried found that all the bones of the body could be involved but the cranium very rarely so.

Carman and Fisher have reported a case of multiple congenital osteochondromata in a man 30 years of age in which all the bones of the body except the skull and face were involved. The microscopical structure showed persistence and overgrowth of poorly ossified or calcified cartilage with the cells irregular in size and form.

Ashhurst under the heading of Multiple Cartilaginous Exostoses Hereditary Deforming Chondrodysplasia reviews Ehrenfried's work and some of the other literature and reports 11 cases of the condition observed by himself. He states that the underlying pathological change in cases of this sort is a chondrodysplasia affecting the metaphyses of the long bone with the exostoses being merely incidental and not the essence of the disease. No hereditary character was apparent in his series.

Bentzen has recently published a report of a case which is typically of the type under discussion.

A girl 15 years of age gave a negative family history. When she was 5 years old the parents noticed that her right leg was shorter than the left and from that time on the shortening had become more pronounced. When she was 11 years old the right femur was fractured by a simple fall from a bicycle, the lesion occurring at a point where a subsequent examination showed rather extensive changes in the bone. Two other fractures occurring at different times in the upper extremities were due to severe injuries and had apparently nothing pathological in their etiology. At the time of the examination the leg was 8 centimeters shorter than the other and as a result there was a

long right total scoliosis. Roentgenograms showed very remarkable structural changes in the bones of the right lower extremity and pelvis the rest of the skeleton being negative except for an anomaly of the second dorsal vertebra. Films taken when the child was 7 years of age were at hand for comparison but aside from the fact that a certain amount of healing seemed to have taken place there was little difference in the pictures. Both metaphyses of the tibia showed longitudinal stripe shaped clear areas as if long chips had been taken out with a gouge and a similar picture was present in the wing of the ilium the stripes being arranged in a rather irregular fan shape. The lower end of the femur was involved in the same way but around the region of the lesser trochanter there were spot shaped clear areas. In the foot the first phalanx of the second toe was definitely involved and two clear spots were seen in the first phalanx of the great toe.

Bentzen was able to find twelve cases of Ollier's disease in the literature but his was the first one recorded where only one extremity the right lower was involved. (The twelve cases recorded are Nove Jossier and 1 Ollier and Mohn 3 Wittick 1 Coon 1 Koehler 1, Burchardt 2 Bojesen 1 Johanson 1 and Johannessen 1.) His study showed that although these cases differed from each other in some ways the roentgenograms were very characteristic and allowed the condition to be distinguished from all other known diseases of bone. The differences are due mostly to the different stages obtained and where the changes are great the stripes and spots disappear and the bone becomes very much deformed. All of the authors agree that the clear areas seen either as stripes or spots are due to cartilage being present where bone is normally found and the consensus of opinion is that these cartilaginous masses are not true tumors. Bentzen found a hemiatrophy of the face in his case and this was also reported in three of the twelve cases mentioned the atrophy being on the same side as the involved extremities. The fact that this symptom is one which is found in lesions of the upper sympathetic tract together with the observations that the distribution of the peculiar striping in the involved bones is apparently the same as the distribution of the blood vessels in the bones and that the lesion is so typically asymmetrical led Bentzen to undertake a series of experiments on rabbits in which either the sympathetic cord was de-

spermatozoa immobile were such a variable factor that from these experiments no opinion is justifiable

CONCLUSION

These results cast no light upon the etiology of so called 'idiopathic' human sterility, they tend to eliminate protein sensitization as a causative factor. They do, however, suggest possibilities of supplying a contraceptive technique with a definite scientific basis and upon this further research is now being attempted.

I wish to express thanks to Dr. L. Hektoen for his constructive criticism and demonstration of technique and to Dr. Mark T. Goldstone from whose chemical material the human results were compiled.

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Fig 5

Fig 5 Roentgenogram of thigh and leg, anteroposterior position



Fig 6

Fig 6 Roentgenogram of thigh and leg, lateral position



Fig 7

Fig 7 Roentgenogram of ankle and foot, lateral position

free. These cases showed a longitudinal striation in the metaphyses of practically all the long bones in the body and the fan shaped striation in the wings of the ilia as previously

described in Bentzen's case. Voorhoeve's article goes into the literature very carefully and is one of the best discussions of the subject under consideration that has appeared.



Fig 4 Roentgenogram of pelvis and thighs



Fig 8 (left) Roentgenogram of front of foot



Fig 9 Roentgenogram of left thigh and knee, anteroposterior position

Following is the report of W. Ophuls, Department of Pathology, Stanford University Medical School. Specimen consists of a portion of the pancreas which on the cut surface shows irregular chocolate brown areas alternating with areas of normal tissue.

Microscopically the sections show many lobules which are completely destroyed, others are partly necrotic surrounded by polymorphonuclear leucocytes. The interlobular spaces as well as many of the lobules contain many red blood cells as well as blood in various stages of decomposition. Some lobules are normal except for some hæmorrhage extending between the alveoli. Several of the larger veins contain recent thrombi. *Pancreatitis, acute hæmorrhagic.*

L. Flores of the Surgical Division of the Stanford Service of the San Francisco Hospital made the following report:

Between all of the pancreatic acini almost uniformly distributed in thin and normal septa there lie recent hæmorrhages, but the cells of the acini themselves as well as the islands of Langerhans stain perfectly well and are not necrotic with the exception of a few minute areas at the very periphery where there are also intra-acinary hæmorrhages and an inflammatory exudate in a few acini. The cells are definitely necrotic. The vessels are engorged. The pancreatic ducts are empty. *Diagnosis: early hæmorrhagic pancreatitis.*

The postoperative course of this case was uneventful. There was considerable drainage from the wound for several days of purulent material which contained no activated pancreatic ferments. Culture yielded a growth of hæmolytic staphylococcus aureus.

In this case it is interesting to note the absence of premonitory symptoms and the absence of recognizable foci from which thrombi might have been carried to the pancreatic vessels. In 1912 Deaver and Pfeiffer discussed the etiology of acute pancreatitis and claimed that the disease was due to infection borne through the lymphatics. As the lymphatics run from the head of the gland to the tail, so infection more often commences at the head of the pancreas and extends into the tail. In the above case the tail of the pancreas showed marked pathology in which the remainder of

the gland did not share. The close relationship existing between acute pancreatitis and biliary disease has been recognized by many investigators and undoubtedly exists but in the case now presented no pathology of the biliary system existed.

The absence in this case of shock and cyanosis so frequently associated with acute hæmorrhagic pancreatitis may be attributed to the small mass of the gland involved. The absence also of the typical fat necroses indicates that little if any of activated pancreatic juice was liberated into the peritoneal cavity. The symptoms more typically associated with acute hæmorrhagic pancreatitis would in all probability have supervened had the operation been delayed.

Possibly small hæmorrhages take place into the pancreas more often than we have any knowledge of, causing gastric upsets that are explained on the basis of indiscretions in diet. When these hæmorrhages take place in the head of the pancreas and there is pathology present in the bile passages a severe pancreatitis often results. If these hæmorrhages are slight and in the body or tail of the pancreas it is our opinion that recovery without intervention often occurs. If the resistance is lowered by exposure, exhaustion or some debilitating illness plus focal infection bacteria will undoubtedly lodge in the hæmorrhagic areas and produce just such a picture as we have described.

We firmly believe that slight hæmorrhages into the pancreas are not uncommon. Whether the infection comes through the lymphatics or blood stream or is a retrograde infection coming through the pancreatic ducts, the resulting inflammation is similar except that the retrograde infection through the pancreatic duct is more extensive and activation of the ferments of the pancreatic secretion will cause more destruction.

a separate entity especially as some of these cases such as Coon's and the one just reported show slight changes also on the opposite side of the skeleton. If the term Ollier's disease is to be used it should be used to describe the asymmetrical cases only but with the understanding that the cases so named are only a small division of the large group of cartilaginous dystrophies called by various names but by Ehrenfried hereditary deforming chondrodysplasia. Although heredity seems to be a factor in a certain percentage of these cases there are so many others especially the asymmetrical type which have no apparent hereditary basis that it seems as if the omission of this term would be more suitable when naming the lesion. It is interesting to note the similarity between certain parts of the case being reported and the various cases reported in the literature. Ollier lays stress on the roentgenological picture of rarefied areas with denser white spots scattered throughout. This picture is seen very typically in the lower end of the femur and in both ends of the tibia in the author's case. Both Ollier and Coon speak of the areas of lessened density in the phalanges. Ollier describing them as similar to a small chondroma. This picture is similar to the one seen in the foot in the present case and the irregularity in the length of the toes which Ehrenfried brings out in his article is also present. The striations which seem to be such a striking feature of some reported cases and which have even been reproduced experimentally in rabbits were not present in the case under consideration unless the appearance in the neck of the femur can be interpreted as such. Many roentgenograms of cases of proved osteitis fibrosa show a condition in the bone which simulates very closely that seen in some of the reported cases of chondrodysplasia but at no place in the

films of the present case could such a condition be diagnosed and the differentiation should not be difficult.

CONCLUSIONS

The conclusions to be drawn from this brief review seem to be

1 Ollier's disease is a term which seems fixed in the literature but which should be used only to designate those cases of cartilaginous dystrophy with or without cartilaginous tumor or exostosis formation which show an asymmetrical involvement of the body as the outstanding clinical feature.

2 Chondrodysplasia (a term preferable to dyschondroplasia) is a condition which is usually asymmetrical but as several symmetrical cases are on record the term must therefore be broader in its application than Ollier's disease.

The gradation of reported cases between those of frank multiple cartilaginous exostoses on the one hand and the so called chondrodysplasia with no change in anything but the internal architecture of the bones (Voorhoeve's cases) on the other is so varied and irregular that a definite classification of cartilaginous dystrophies is still impossible. The possibility that the apparently widely different findings in some of these cases are only manifestations of different stages of the same condition must not be overlooked.

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A very complete list of the literature on chondrodysplasia will be found in the first two of the above. The author's list comprised practically the same references.

7 The principle of co operative education (concerning rare diseases) among laboratories (the founding of other Registries)

8 The possession by the American College of Surgeons of collections of data on 100 standard benign giant cell tumors 100 standard osteogenic sarcomata of the femur 100 standard osteogenic sarcomata of other bones 50 standard cases of Ewing's tumor (These data are neatly packed in trunk like boxes available for study by investigators or by pathologists or surgeons who see few bone tumor cases but who occasionally must decide questions of life and limb)

9 A principle suggested for the new Museum of the College (and for other museums) of accumulation of data on accepted standard clinical entities in available form for intensive research and educational study

10 The idea that the Museum might become a sort of patent office of new clinical entities. A practical example of this idea by submitting a collection of over 50 cases of Ewing's tumor

11 The suggestion that the College should devote its energies to the standardization of series of surgical cases asking from hospitals duplicate records of one series after another (For instance a check on the standardization of hospitals might be made in epitome on the manner in which the cases of bone sarcoma are registered since such registration tests not only the apparatus of roentgenologist pathologist and surgeon but the education cerebration and practical efficiency of the staff and perhaps even their consciences)

There are other by products but the true product of our industry is small—only 17 cases of 5 year cures of primary malignant tumors of bone on which the Committee can agree even tentatively. And in these cases much essential evidence is lacking. In ten of these for instance the X ray has been lost. The evidence on few of the 17 is entirely convincing.

As to the treatment all but 1 of the 17 had amputation and that one had a local exploration followed by intensive radium treatment and mixed toxins. Nine of the other 16 also had toxins. Eight also had radiation. In 8

cases these treatments were combined. Seven had no other treatment than amputation so far as we know.

I think the average surgeon will perhaps be content with the two paragraphs above. He will continue to amputate in doubtful cases if he thinks there is any possible chance that no metastases have already occurred. He will ignore the fact that the one radium and toxin cure probably represents a greater percentage of cures among those where this combination of treatments has been attempted than the sixteen amputations represent to the vast number in which surgery has failed.

We have many unknown factors (1) How many amputations have been done and failed? (2) How many cases have there been in which the mixed toxins have been *thoroughly tried* and failed with or without amputation? (3) How many cases have received *thorough* radiation with or without surgery?

We have few facts and can estimate as we please. The answers are probably (1) Very very many (2) A good many (3) Very few or even very very few. And all this guess work must take into consideration that of all the cases submitted to the Registry as sarcomata the Committee believes only a little over 50 per cent were actually malignant primary tumors of bone!

Since the Registry was not quite 5 years old at the time this set of 17 cases was agreed on by the Committee (June 1 1925), the real use of the collection in answering our question will not be attained for 5 years from that date. It can then deal with cases of standard diagnoses agreed on before the result is known. *At present we can only say that it is probable that an occasional case may be saved by amputation or by amputation combined with toxins and radium and that in 1 atypical case of primary malignant bone tumor with metastasis in the groin the patient recovered after an exploratory operation and the postoperative use of Coley toxins and radium.*

Will the reader please reconsider the last sentence and bear in mind that these statements were made by the Registrar of a Committee of the largest surgical society in the world consisting of over 7000 members every one of whom has been repeatedly solic



Appearance of varix after dissection from its bed $\frac{3}{4}$ actual size. It lies over the saphenous vein and femoral triangle. In *ext* shows lateral view of varix and its relation to other veins.

compression over the femoral ring gave the impression that the swelling was permanently reduced. There were no varicose veins of the leg. The thrill described by other observers was not felt. Possibly the dilated veins over the lower abdomen should have aroused suspicion but unfortunately so far as an accurate diagnosis was concerned they did not. The duration of the swelling 6 years was also unusual most of the reported cases having been noticed only for a period of a few weeks or months.

CONCLUSION

A varix of the superficial epigastric vein is reported. Though such a condition of the saphenous is not unusual its occurrence in this particular vessel is apparently unique.

The usual diagnostic signs were absent in this case possibly accounting for the erroneous clinical diagnosis of femoral hernia.

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TABLE I

Case	Case Number	History	Onset with pain	Diagnosis	General condition	Age	Sex	Site	Character of lesion	Duration	Course	Prognosis	Result	Remarks
1	1	Female	40	Right femur	1890	Female	40	Right femur	1890	Female	40	Right femur	1890	Female
2	2	Male	35	Left femur	1891	Male	35	Left femur	1891	Male	35	Left femur	1891	Male
3	3	Female	25	Right femur	1892	Female	25	Right femur	1892	Female	25	Right femur	1892	Female
4	4	Male	30	Left femur	1893	Male	30	Left femur	1893	Male	30	Left femur	1893	Male
5	5	Female	20	Right femur	1894	Female	20	Right femur	1894	Female	20	Right femur	1894	Female
6	6	Male	25	Left femur	1895	Male	25	Left femur	1895	Male	25	Left femur	1895	Male
7	7	Female	30	Right femur	1896	Female	30	Right femur	1896	Female	30	Right femur	1896	Female
8	8	Male	35	Left femur	1897	Male	35	Left femur	1897	Male	35	Left femur	1897	Male
9	9	Female	40	Right femur	1898	Female	40	Right femur	1898	Female	40	Right femur	1898	Female
10	10	Male	45	Left femur	1899	Male	45	Left femur	1899	Male	45	Left femur	1899	Male
11	11	Female	50	Right femur	1900	Female	50	Right femur	1900	Female	50	Right femur	1900	Female
12	12	Male	55	Left femur	1901	Male	55	Left femur	1901	Male	55	Left femur	1901	Male
13	13	Female	60	Right femur	1902	Female	60	Right femur	1902	Female	60	Right femur	1902	Female
14	14	Male	65	Left femur	1903	Male	65	Left femur	1903	Male	65	Left femur	1903	Male
15	15	Female	70	Right femur	1904	Female	70	Right femur	1904	Female	70	Right femur	1904	Female
16	16	Male	75	Left femur	1905	Male	75	Left femur	1905	Male	75	Left femur	1905	Male
17	17	Female	80	Right femur	1906	Female	80	Right femur	1906	Female	80	Right femur	1906	Female
18	18	Male	85	Left femur	1907	Male	85	Left femur	1907	Male	85	Left femur	1907	Male
19	19	Female	90	Right femur	1908	Female	90	Right femur	1908	Female	90	Right femur	1908	Female
20	20	Male	95	Left femur	1909	Male	95	Left femur	1909	Male	95	Left femur	1909	Male

Therefore if the patient sought advice in less than a month or over a year from the onset of symptoms we may suspect that the case is not one of osteogenic sarcoma

3 The general condition Apparently bone sarcoma does not arise in the unhealthy except after 50 in cases of Paget's disease of the skeleton. If the patient was in poor health at the onset the probabilities favor the tumor being inflammatory—tuberculosis syphilis osteitis etc. Bone sarcoma seems to be a disease of the healthy whose repair processes may be exuberant. This statement is not at variance with the belief of Ewing expressed to me in conversa-

tion that persons who develop bone sarcoma may have some essential defect in their mechanism for tissue repair. I believe myself that these patients repair to death as persons with hæmophilia bleed to death. That is that the mechanism which should check repair is absent or diminished just as in persons with hæmophilia the clotting mechanism is abnormal. However these sarcoma patients almost invariably appear to be in good health.

Therefore unless the patient is considered in good health just before onset we may suspect the case is not one of osteogenic sarcoma.

- 1 Perforating wounds
 - Entrance
 - Entrance and exit
 - Abdomino thoracic wounds
- 2 Non perforating
- 3 Ruptured viscus either intestine or solid organ

As we have only shock and the presence of free fluid as a means of diagnosing non penetrating wounds early exploration is the only treatment

When a surgeon receives a patient with a diagnosis of acute abdomen from the family physician the first question he asks is "Is this an acute surgical abdomen or a referred pain from some thoracic lesion as for instance acute pneumonia or diaphragmatic pleurisy or is it the gastric crises of locomotor ataxia gastro enteritis or any other non surgical disease?"

It is not the purpose of this paper to discuss the diagnosis of the acute abdomen but to warn every surgeon to make his own diagnosis and if there is time to make a blood count I should much prefer a complete count. In any case it is better to depend upon clinical observation than to hold up the operation until the laboratory is heard from. Experience has taught that a diagnosis must be made independently of that made by the physician who refers the patient.

Morphine should not be used until an operation has been decided upon. When it is necessary to move the bowels enemas should take the place of cathartics.

It has been well said that an operation had better be done early than well but it should not be undertaken until the surgeon is satisfied by a careful analysis of the history and a painstaking examination that he is dealing with an acute abdomen. The surgeon must possess trained powers of observation in open mind and quick decision and having made his decision he must proceed directly to each step in the treatment in order to succeed.

The points to be considered are time of operation the choice of anesthetic lastly the method of operation (incision treatment of the disease closure of wound)

In dealing with the acute abdomen we are facing one of two conditions first pus or in-

fectd material has either burst into the peritoneal cavity or is threatening to do so or because of a perforating wound, the contents of the intestine is soiling the peritoneum. In the second instance we have the rupture of a viscus or a tumor either through trauma or torsion or disease within the viscus as an acute hemorrhagic pancreatitis. Here the time to operate is immediately unless the patient is in a state of severe shock. In the first instance, if we are dealing with an unruptured abscess the program is simple but if rupture has taken place or if through a perforating wound the abdomen is becoming contaminated the peritoneal cavity may be in what has been described as (1) the stage of contamination (2) reaction (3) stage of peritonitis.

The operative procedure depends upon which of these three stages we have reached. It is to be understood in this discussion that the patient is not too badly shocked to undergo an operation if it is conducted rapidly and as a life saving measure. The problem before the surgeon at this point is the extent of absorption. We will first discuss the absorptive power of the peritoneum with regard to the character of the fluid about to be absorbed. I am using this term to include all solid particles floating in the fluid as debris pus corpuscles and bacteria. We know that hypotonic fluids absorb readily and that hypertonic fluids are reduced to isosmotic by peritoneal exudate before absorption can take place.

Leathes and Starling (Hertzler) found that 39 per cent of a hypotonic solution was absorbed in the first half hour. At the end of 2 hours 49 per cent was absorbed. The slowing of absorption was due to the establishment of osmotic equilibrium. The absorption of blood begins in about 4 hours and is complete in about 48. Large solid particles are enclosed by exudate. Smaller ones are absorbed by the blood stream. It has been shown that the blood stream carries off the fluids faster and to a greater degree than the thoracic duct (McGuire). Experimentally lymphaticostomy for the prevention of toxemia from peritonitis has so far failed. Certain drugs injected into the peritoneal cavity have been

Joint or peri articular structures (unless there is fracture also)

Therefore in a case in which there is not a considerable degree of free motion in the adjacent joints we may suspect that the tumor is not an osteogenic sarcoma

5 *Site and shape* No early sarcoma of small size nor of distinctly pedunculated shape has yet been registered. The facts that they are usually well developed when first noticed that they usually surround the bone or most of its circumference, that they are as a rule both intracortical and extracortical that they grossly resemble callus make the writer feel that it is almost absurd to suppose that they start in small areas and then spread. They can better be understood as starting in a region as callus does than in small groups of cells. If the latter why should they grow through the strong cortex to the other side no matter which side they start on? At any rate thus far all gross specimens show tumors of considerable size which are both medullary and subperiosteal with the old cortex more or less firmly in its old place. Pedunculated bone tumors are nearly always benign except when congenital exostoses have been excited by trauma to efforts at repair.

Therefore if a tumor is not of considerable size or if it is pedunculated we may suspect it is not an osteogenic sarcoma

THE X RAY

The X ray also furnishes us with five pretty constant criteria

1 *Combined central and subperiosteal involvement* Good roentgenographic pictures of osteogenic sarcoma demonstrate this point almost as well as sagittal gross sections. One must bear in mind however that superimposed bone outside the cortex may make the medullary shadow irregular in density. The little cuff of reactive bone of trumpet shape which surrounds the upper limit of the tumor appears in the X ray as a triangular space on each side of the shaft under the uplifted periosteal edge. The presence of this is a sure indication of subperiosteal extracortical involvement. It represents the last line of defense of normal osteoblasts retreating in circular formation as the tumor advances under

the periosteum. Unfortunately the same phenomenon sometimes occurs as a defense against inflammation so that this reactive triangle in itself is not diagnostic of sarcoma. Benign tumors are either inside or outside the old cortex. Malignant are both.

If we may therefore suspect that it is not a case of osteogenic sarcoma when the X ray does not show both medullary and subperiosteal involvement

2 *Presence of old shaft* As stated above we rarely dissect a specimen of osteogenic sarcoma without finding the old shaft in its normal position—even if it is in fragments. It may be almost entirely destroyed in old tumors but even then the remaining fragments are seldom pushed much out of place. The contrary takes place in benign giant cell tumor which gives the appearance of distending the bone. In Irving's tumor the cortex is usually widened by the thrust of the tumor cells between the lamellae and old bone may be carried somewhat to the periphery. In osteogenic sarcoma the perforation of the cortex seems to be as a rule transverse from within outward radially through the cortex or perhaps in the opposite direction. We have no clue as to whether they start inside or outside the cortex. If new bone forms it follows these radiating lines. One must think of these radiating lines not as they show in the X ray as spicules but as they really are in the gross specimen as ridges or osteophytes of irregular form on the surface of the cortex.

Therefore if the X ray does not show the old cortex or fragments of it in normal position we should suspect that the case is not one of osteogenic sarcoma

3 *Invasive character* Dissection shows and so do our standard series of osteogenic sarcomata that the advancing edge of these tumors in the spongy bone is practically never rounded and smooth as is nearly always the case in giant cell tumors and some vascular carcinomatous metastases. Osteogenic sarcoma advances by invasion of the cells and the margin is irregular. Giant cell tumors and a few vascular metastases advance by pressure atrophy due to their pulsation as do aneurysms.

Therefore a sharp outline of the tumor against spongy bone may make us suspect that we are not dealing with an osteogenic sarcoma

from the abdominal cavity. Since it has been found that acidosis following anesthesia is one of phosphoric acid and not an organic acid, surgeons have abandoned sugar solutions which only add to the hyperglycemia and are using hypotonic salt. For the treatment of hemorrhage and shock blood transfusion takes precedence over all measures.

In the stage of peritonitis if it is thought advisable to adopt the Murphy drainage method of operating local anesthesia is best. If on the other hand a radical incision is to be made there are two reasons for using general anesthesia of gas oxygen and ether. First the necessity for rapid anesthesia and second the desirability of maintaining sufficient intra abdominal pressure to prevent undue absorption. In such an operation packs intra abdominally, sandbags along the side of the walls of the abdomen and the assistance of the interne's hands may be used to maintain pressure.

Shock is an important factor in the treatment of abdominal cases. To anticipate shock is better than to be compelled to stop an operation and rally all the forces of the operating room to treat shock. We are all familiar with the signs of impending shock and I believe that every well equipped hospital should have its house staff trained to combat this condition in its incipency.

In selecting the site for the incision we are influenced by two factors—the accessibility to the lesion and the prevention of infection of the general peritoneal cavity. In acute lesions in which walling off is not to be expected accessibility generally speaking is the dominant factor while later when there is a partial or complete walling off the prevention of infection is the more important. Conservatism should be the aim of the surgeon. The acute abdomen is an emergency and enough should be done to place the patient out of danger.

To complete a cure it may be necessary to do a two-stage operation bearing in mind that the first is life saving. It is a temptation particularly to young surgeons who are developing their technique to prolong an operation unduly in their enthusiasm to perform a brilliant and spectacular operation.

The laws of physiology not the laws of hydrostatics are those which must be studied in attempting to solve the problem of drainage. As a general principle gauze should not be left in contact with the coils of the intestines but layers of porous non adhesive material such as bobinette saturated with paraffin or perforated rubber tissue should be interposed between the intestine and the gauze. A rubber tube or an accordion rubber drain should be the choice for encysted abscesses. In acute peritonitis where it is decided to use the Murphy incision a rubber tube of sufficient caliber should be placed deep in the pelvis through a low central incision with cigarette drains through stab wounds in the flank and over the dressings a snug fitting abdominal bandage should be applied. It is generally conceded that drainage is usually of no value after 48 hours.

Closure of the abdomen may be done in the single layer by means of the nævus needle if the patient is in danger of collapse. If each layer is held by forceps and properly transfixed it is possible to get fairly good apposition but layer closure is better.

SUMMARY

The majority of acute non traumatic abdominal conditions develop from some chronic pathology. A careful review of the history is sometimes necessary to develop this fact. If the patient is too ill the relatives must be consulted in order to get a complete history. The extent of traumatic abdominal lesions can not be fully known except by operation. The experience in abdomino thoracic surgery in world war wounds has shown that in operations performed within 20 hours of the time the wound was received bold radical surgery was conservative. I believe the same rule holds in the treatment of the early stage of peritoneal contamination. Later when peritonitis has set in before it is decided whether to operate or not or whether a conservative or radical operation is to be done one should judge the resistance of the patient, the extent of absorption and the amount of infection in the peritoneal cavity.

Perhaps it is better in the light of our present knowledge to warn against inter

and the arrangement of chromatin nucleus and nucleolus. However, it does not yet appear necessary to attempt to grade osteogenic sarcoma, for our collection is not yet large enough and as yet we cannot say bad worse worst. To say Bad is enough for after 5 years search we find only 13 cures.

Therefore any bone tumor which does not show pleomorphism is probably not an osteogenic sarcoma

3 *Tumor giant cells.* It is not difficult to demonstrate to a student the difference between typical tumor giant cells and foreign body giant cells. However occasional doubtful giant cells are found, but very rarely are all the giant cells in a single slide doubtful. A few individual giant cells or small areas of foreign body giant cells are of frequent occurrence in osteogenic sarcomata and have little significance in diagnosis as they probably merely indicate hæmorrhage in the tumor. On the other hand one may confidently expect a tumor to be malignant if it contains tumor giant cells but not necessarily to be a primary bone tumor. Tumor giant cells may occur in cancer also but we seldom see them in bone metastases. Then too many osteogenic sarcomata show no tumor giant cells.

This criterion therefore is not universal but we may say that its presence in an osteogenic tumor is a very reliable sign of malignancy but its absence need not make one suspicious either of the malignancy of the tumor or of its place in the osteogenic series

4 *Differentiation.* It has proved impossible to make the differentiation toward intercellular substances as fibro chondro osteo-criteria of malignancy. There is an endless variety of proportions of these intercellular substances and an imperceptible series of gradations from one intercellular substance to another. At most differentiation can only be used as a criterion of degree the less the differentiation in other words the more cellular the tumor the more malignant. And now that radiation has been shown to be effective in the inverse way it is still harder to use this factor as a criterion. For instance Ewing's tumor which may be simply an undifferentiated form of osteogenic sarcoma has nowa days with radiation a better prognosis than a

relatively well differentiated osteogenic sarcoma of the chondro type. Yet the relative proportion of cellular tissue in chondromatous tumors is very important in their prognosis for the greater it is the worse the prognosis.

Therefore in an osteogenic tumor very complete differentiation or almost no differentiation is better than incomplete differentiation and the evidence of quite complete differentiation should make us suspect that the case is not an osteogenic sarcoma but a benign osteogenic tumor

5 *Tumor vessels (vascular arrangement).* As this criterion is my own hobby I hesitate to present it but as I have found it very reliable even if new I offer it for it may help others. Early in the Registry work I noticed that the malignant tumors had a different vascular arrangement from the benign giant cell tumors. The latter have only capillaries or sinuses without any walls except the endothelium lining them. As a contrast to this all malignant tumors have definite branching vessels with walls of varying thickness largely composed of tumor cells. In other words these tumors have a penethelial arrangement as a constant factor and the vessels branch like the limbs or twigs on a tree. The tumor cell hang on them like swarms of bees whether the cells have no intercellular substance as in Ewing's tumors or well developed cartilaginous material as in some chondrosarcomata. One may see an endothelial lining or perhaps a lining of tumor cells and immediately adjacent penethelial arrangements of cartilage cells. Great variety of appearance of these tumor vessels is a characteristic also.

I find these tumor vessels a constant factor. They are certainly useful in distinguishing giant cell tumors from the osteogenic tumors benign and malignant. As a criterion to differentiate malignant from benign osteogenic tumors or callus it again becomes a question of the individual cells forming the walls. Benign osteogenic tumors do not have pleomorphic cells in the vessel walls. I made one error in considering exuberant callus malignant on account of somewhat atypical vessels.

Ify personal conclusion is that every osteogenic sarcoma shows tumor vessels and that a tumor which does not show them in several sections is not an osteogenic sarcoma

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running through the woods. An idea of the height of the animal is obtained at one glance: the flash of a white tail at another and the outline of horns at a third. The conviction that a deer has passed may be arrived at but the story the hunter tells will be believed in proportion to his own experience and standing in intellectual honesty. At that he may be mistaken.

Expert opinion would not be expert opinion if as a rule it were capable of proof. The relative importance of the criterion of the Registrar Classification is of this degree and varies with the character of the data and of the Committee.

The entity of osteogenic sarcoma has been recognized by a group as hunters recognize a rare animal by repeated glimpses in all degrees of perfection from a flash through the woods to the slaughtered dissected stuffed macerated dried bottled or serially sectioned in individual. One hunter who might recognize the fossil vertebra of the animal might not recognize the living creature darting through the woods. The practical hunter would although he might confuse it with one of an allied species. The Registry Committee has had the advantage of being aided by much expert help and by varied points of view from different individuals. It has succeeded in establishing this entity and describing its characteristics but in individual cases it may be mistaken on fleeting glimpse. The 13 cases here submitted are of this character. It is our belief that they were instances of osteogenic sarcoma but we ourselves recognize the possibility of error.

In our series of 200 standard osteogenic sarcomata nearly 50 per cent are still living under the 5 year limit. We feel much more sure of the correctness of diagnosis in most of these cases than in the 13 although in many much of the outline was behind the trees.

5. *The ultimate result.* It is easy to say that the Committee modify their diagnoses when they know the result. This is true we do so far as we can but in many cases we do not yet know the result. We have also been criticized for letting each expert see the opinions of those given before him. We are in fact glad to have him do so. We want every bit of information and advice we can get and so should every

expert. It can do no harm for we realize that on such data as we get this writing of opinions is often merely an amusing mental exercise.

To be sure there is a serious side when we think of how many unregistered cases of bone sarcoma do not even get the benefit of the opinion of the Registrar which is freely given for rich or poor and always should be. In our hospital decisions in cases of bone sarcoma are often made on less experience than that which even a newly appointed Registrar would have at his command. Very few pathologists or surgeons see 10 cases of this lesion in their whole professional careers where the diagnosis is definite and the outcome known. A new Registrar who has studied this series of 650 cases could certainly be of help to anyone on whom the responsibility of decision of life and limb rests.

But we must confess that even the most experienced after the study of all the 650 registry cases must sometimes modify his diagnosis by the ultimate result. If a case diagnosed as osteogenic sarcoma does not die within 5 years without metastases in the lungs all criteria should again be scrutinized with the greatest care.

PART II—THE 13 CASES OF 5 YEAR CURES OF OSTEOGENIC SARCOMA

As most of these cases have already appeared in the literature I will merely give references and discuss a few points in each.

CASE 20. This case has never been published in detail. It was that of a boy of 14 with a tumor of the upper end of the tibia. He was the nephew of an able surgeon who recognized the seriousness of the lesion within 6 weeks of onset and promptly did a thigh amputation. It is perhaps the record for prompt diagnosis and treatment. The patient has been well for 9 years. An interesting feature of this case was that postoperative treatment was conducted by Dr. James B. Murphy of the Rockefeller Institute on his theory derived from experiments in animals that a mild lymphocytosis repeatedly aroused by light diffuse doses of the roentgen ray prevents experimental inoculation of tumors in animals and therefore might prevent the growth of small metastases in the human being.

There are several of our criteria lacking in this case for instance the onset was with trauma not pain, the history a matter of weeks rather than months, no x-rays or gross specimen have been preserved, the hyperchromatism is not great, no single mitoses very frequent. In fact the diagnosis is largely based on the extreme pleomorphism of the

being taken not to repeat this often enough to traumatize the vagina and thus impair fertility. In a similar fashion human and guinea pig spermatozoa were used as an antigen. Controls were other female rats of the same age and selected under the same conditions but injected with typhoid bacteria and extracts of male salivary gland. It was found in earlier work that when blood for serological tests was obtained by cutting off part of the rat's tail or otherwise traumatizing the rat's fertility was impaired. The blood of the sensitized animals was obtained at the termination of the period of observation; animals whose blood was examined at other times were not listed in the results.

As an explanation for the mechanism of sterility search was made for the presence or absence of precipitins, agglutinins, lysins or toxins in the sera of the injected animals by testing the effect of such sera on active spermatozoa which were obtained by shaking them out of fresh testis into isotonic salt solution at 37°C. For precipitins the contact method was used while agglutinins, lysins and toxins were determined in hanging drops.

RESULTS

The intramuscular injection of rat spermatozoa into female albino rats with technique as outlined induced a period of sterility varying from 6 to 22 weeks with an average of 12 weeks (Table I). This confirms the work of McCartney (21) which stimulated interest as to whether the sterility produced in this manner is necessarily specific for species. In order to determine this two series of animals were sensitized to human and guinea pig sperm. The results were significant in that rats injected with guinea pig sperm remained sterile from 6 to 29 weeks with an average of 14 weeks; those sensitized to human spermatozoa remained sterile from 3 to 26 weeks with an average of 14. Four rats whose sera had been used during the observation period and hence not listed in the results remained sterile for over one year when they were killed for rat over 18 months old are worthless for this type of research approaching at this time their menopause (13). In contrast with these results the controls after sensitization

TABLE I—SENSITIZATION OF RATS TO RAT SPERMATOOA

(Results in 10 of a series of 40)

No.	1st litter		Dates of injection	Results	Interval between 1st or 2nd sensitized rats at 1st litter
	Date	N			
1	5-1-24	5	5-2-24 5-6-24 5-10-24	No preg	24 weeks
2	5-3-24	5	5-2-24 5-6-24 5-10-24	No preg	22 weeks
3	6-1-24	6	6-10-24 6-14-24 6-18-24	Litter of 5 9-15-24	12 weeks
4	6-3-24	5	6-10-24 6-14-24 6-18-24	Litter of 5 8-10-24	9 weeks
5	6-20-24	4	6-30-24 7-3-24 7-7-24	Litter of 4 9-1-24	8 weeks
6	6-25-24	7	6-30-24 7-3-24 7-7-24	Litter of 5 12-10-24	22 weeks
7	10-4-24	6	10-11-24 10-15-24 10-18-24	No preg	22 weeks
8	10-9-24	5	10-11-24 10-15-24 10-18-24	Litter of 5 3-3-25	19 weeks
9	12-15-24	6	1-3-25 1-7-25 1-11-25	Litter of 6 6-1-25	24 weeks
10	1-29-25	6	2-2-25 2-6-25 2-10-25	Litter of 5 3-15-25	6 weeks
Average of 40 rats of this series					12 weeks

with typhoid bacteria and salivary gland extract had their second litters in 5 weeks which is about normal for healthy rats.

Ovulation persisted throughout the entire period of sterility in all animals as demonstrated by the cyclic changes in the vaginal scrapings.

SEROLOGICAL RESULTS

Precipitins for the spermatozoa used were specific up to dilutions of 1/128 in the sera of the sensitized animals; further readings were omitted because of the difficulty in reading the end point. This confirms Hektoen's results (9). The presence of specific precipitins was used as an indication of definite sensitization.

The question of agglutinins is of definite importance in sterility and despite the fact

is a question whether the tumor does not belong in the myeloma series

CASE 102 No X ray is preserved. The data in general are unsatisfactory. There is no good gross description of specimen but the histology is pretty typical of osteogenic sarcoma.

CASE 172 The one favorable feature is Ewing's description of the amputated leg. 'Shows early and unusually limited central and subperiosteal osteogenic sarcoma.'

CASE 184 The sections resemble a very cellular osteitis fibrosa and some of the pathologists class it as such. The Committee however feels that it should be classed as a sarcoma. Mitosis and hyperchromatism are not marked and differentiation is pretty complete. We have no X ray and in such a case the X ray would mean much.

CASE 261 This case has every unfavorable character except that the tumor was pretty well contained beneath the periosteum and in the center of the bone. Histologically it was very malignant. Amputation was done without exploratory incision and there was no after treatment. It is in my opinion the most typical and also the most complete case in the series. It shows surgery at its best.

CASE 408 The character of the exploratory operation through the joint rendered the prognosis very unfavorable. We have no good report of the gross specimen or X ray. However there can be little doubt from the description of the operation and the histology that this was a malignant tumor. It hardly seems as if amputation alone could have cured in this case. No radiation was used according to our notes the mixed toxins were used. Compare the preceding case in which no exploration was done or after treatment given.

Although the pathologists agree that this case was malignant the histology is unsatisfactory for classification.

CASE 501 The notes on this case are very inadequate. There is no real history, no X ray and the histology is barely adequate to include it in this group. Several pathologists have raised the question of its being a giant cell tumor. Complete data even one good X ray would probably expel all doubt.

CASE 586 This case is well registered with X rays, photos and slides but it is really not one of the true osteogenic sarcomata. Had fractured femur at 4 and 11. At 21 had slight periostitis at site of fracture. In August 1916 when 48 years old he had a tumor of the femur at the site of one of the fractures. He was treated by curettage, X ray, radium and toxins for several months and the thigh amputated October 1916. Well in April 1925. There was a fairly circumscribed mass at the site of the fracture and an open granulating wound over it. Histologically it is a sarcoma. There is doubt among the pathologists as to whether it should be classed as an osteogenic sarcoma at all or as a fibrosarcoma arising in scar tissue.

CASE 183 This case is the only one in which amputation did not contribute to the success which

must have been due to radiation or toxins or both. It has been and will be again reported by Dr. Coley in full. It is a unique, remarkably encouraging case for the limb was saved and metastases in the glands of the groin receded and did not reappear. Logically the mixed toxins and radiation must share the credit. There is an almost equally brilliant case, 267, among the Ewing tumors also treated by radiation and toxins.

SUMMARY

One must realize that the cases here presented are by no means the only possible 5 year cures of osteogenic sarcomata in the Registry series. It would be better to say that they are the 13 most authentic ones. Other cases especially Case 187 should perhaps also be included and discussed but there is a limit to interest in the subject if too doubtful instances are brought into question.

I have done my best to be judicial in selecting these and my colleagues, Doctors Blood, good and Ewing have agreed with me that these are the best representatives of cured osteogenic sarcomata and even these are pretty doubtful. If it had not been for Coley's enthusiasm and optimism we should have few to record. Coley has shown us at least that cases considered hopeless may be cured. Even if the hopelessness was due in some cases to the errors of pathologists in mistaking benign tumors for malignant ones, Coley's optimism has been well justified. Whether or not the evidence also justifies his faith in the use of mixed toxins is an academic matter compared with the bald facts that he can furnish evidence of the cure of apparently hopeless cases and that he has furnished evidence of nearly as many cures as all the other surgeons of the country together. He has also furnished evidence of more cures than shown in the above list but some of these other cases are considered by our Committee to be instances of benign giant cell tumor.

From a logical standpoint it seems to me that argument as to the value of the toxins should rest on their postoperative use for the fact is that over one half of the successful cases following amputation have had the postoperative use of this agent. To be sure there are few in all.

Further evidence of the value of the mixed toxins will appear in Conner's paper on



Fig. 1 Photograph of agglutination of guinea pig spermatozoa by non specific sera $\times 110$

reports the actual swelling and dissolution of sperm by blood sera of specific sensitized animals but in no case could this be demonstrated in these experiments for frequently after 24 hours suspension in hanging drops in specific sera spermatozoa would be found intact (Tables I II III)

EFFECT OF SENSITIZATION UPON GRAVID RATS

Pregnancy can be easily determined in rats by the absence of the normal cyclic changes in vaginal scrapings. In a series of o pregnant rats injection of 100 000 00 000 and 500 000 rat spermatozoa at 4 day intervals failed to have any effect upon pregnancy causing neither a decrease of the size resorption nor abortion of the litters. These negative results were obtained consistently and seem important in view of McCartney's opposite finding.

SEROLOGICAL RESULTS IN THE HUMAN

With the experimental facts as a foundation we next tried to demonstrate precipitins



Fig. 2 Large clump in Figure 1 shown in greater detail $\times 230$

agglutinins lysins or toxins in the sera and cervical secretions of 17 normal healthy married women with patent oviducts and no evident pelvic pathology to account for the sterility. The husbands could be eliminated as an etiological factor for they could qualify in all of Huhner's precepts. In no case could any evidence of protein sensitization be found to human spermatozoa protein suggesting that protein sensitization of the female in these so called idopathic sterilities is more fanciful than real.

DISCUSSION

From these results confirming the work of others it is evident that there is an accurate method of temporarily inhibiting conception by sensitization of the female rat to any spermatozoa protein. This antigenic effect of spermatozoa is not specific for species but equally good results can be obtained from the spermatozoa of any species. The mechanism causing this sterility is still not clear only precipitins being definitely present and their significance an unknown factor. The rôle of agglutinins can be considered negative, for as marked clumping can be seen in the sera of non sensitized animals especially after inactivation as in specific sera. Lysins were never seen and toxins which fixed or rendered

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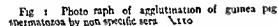


Fig. 1. Photograph of agglutination of guinea pig spermatozoa by non specific sera. X110

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STAPHYLOCOCCUS MENINGITIS SECONDARY TO A CONGENITAL SACRAL SINUS

WITH REMARKS ON THE PATHOGENESIS OF SACROCOCCYAL FISTULA

By TH. ODORF S. MOISE, M.D., NEW HAVEN, CONNECTICUT

From the Department of Surgery, Yale University School of Medicine, and the Surgical Clinic of the New Haven Hospital

THE purpose of this paper is to report a case of meningitis secondary to a congenital sacral sinus in which recovery followed a lumbar laminectomy with drainage. The case is interesting first on account of the unusual point of entry, second on account of its bearing on the pathogenesis of congenital sacral sinuses and third as a case of meningitis in which recovery followed surgical drainage.

The patient, a white male aged 18, was admitted to the New Haven Hospital on September 10, 1924, complaining of a headache and pain in his back. The patient had always had a sinus in the lower lumbar region of his back. At irregular short intervals there had been a discharge of a watery fluid.

One week before admission he noticed that the area surrounding this sinus was tender. This gradually became worse. After 2 or 3 days his spine began to ache. On the day before admission his head commenced to throb. He described this as a spinning headache. He has had some general malaise and anorexia. He has had no nausea, vomiting or convulsions. The family history and personal history are irrelevant. The temperature was 101.8 degrees F, pulse 86 and respirations 20 per minute. The patient appeared acutely ill, his face was flushed and his expression was somewhat anxious. The neck was markedly stiff. The heart, lungs and abdomen were normal. The biceps and triceps tendon reflexes were normal. The knee jerks and ankle jerks were absent. Kernig's sign was positive. In the midline over the lower lumbar and upper sacral region there was a small sinus surrounding which the skin was red and tender. A slight amount of thin pus could be expressed from the sinus.

A lumbar puncture was done with removal of 35 cubic centimeters of cloudy fluid under increased pressure. Examination of this fluid showed 1,450 cells per cubic millimeter. The cells were largely polymorphonuclears. A few Gram positive cocci were seen in a stained smear. The Ross-Jones and Pandey tests were positive for globulin. A culture showed a hemolytic staphylococcus albus. A blood culture showed no growth after 5 days.

A roentgenogram of the sacrum showed a sacralization of the fifth lumbar vertebra, an irregularity in the fusion of the spines of the fifth lumbar and the first sacral vertebrae and a flattening of the spine of the first sacral segment with a defect below this level (Fig. 1).

The patient was treated with daily lumbar punctures. The fluid remained cloudy with a cell count varying from 800 to 3,300 white blood cells per cubic millimeter. Cultures were repeatedly positive for staphylococcus albus.

September 20. 45 cubic centimeters of spinal fluid, cell count 990, were removed and 20 cubic centimeters of the patient's blood serum which had been prepared a few hours previously were injected into the spinal canal.

September 21. The patient complained of severe headache and generalized pain which was most severe in his back and legs. The temperature was 101.6 degrees F, pulse 104 per minute. A cell count of the spinal fluid was 3,700 per cubic millimeter.

Clinical diagnosis: pyogenic sinus, spinal abscess, occulta staphylococcus meningitis.

Operative note, September 23, 1924. The sinus was injected with methylene blue and excised with the surrounding tissue. The sinus extended through a small bony defect (measuring about 1 centimeter in diameter, Fig. 21) just to the right of the midline at the junction of the first and second sacral vertebrae. The incision was then extended and a laminectomy performed. The spine of the first sacral vertebra was flat. The spinous process was removed from the first sacral segment. The defect was enlarged by removal of the lamina of the first and second sacral vertebrae.

The underlying dura was stained deeply with methylene blue. There was a tuft of granulation tissue just beneath the defect in the spinal column. This was excised after the dura had been opened. The spinal fluid was stained with methylene blue. The dura was left open. A small rubber tissue drain was inserted through the upper part of the incision down to the dura. The wound was closed in layers.

Pathological note. Microscopic examination of the excised sinus showed a lining membrane of several layers of stratified squamous epithelium surrounded by a dense fibrous wall.

The patient's temperature had ranged between normal and 103 degrees F up until the day of operation. On the following day it fell to normal. There were occasional elevations to 102 degrees F during the first 14 days after operation when it became normal and remained so until he was discharged. The drainage of spinal fluid continued for 9 days following operation. The postoperative convalescence was uneventful except for frequent severe pain in his lower back and legs. He was discharged on November 11, 1924. At the time of discharge a neurological examination was negative and the patient was well.

ACUTE HÆMORRHAGIC PANCREATITIS

REPORT OF AN EARLY CASE RECOVERY FOLLOWING RESECTION

BY EDMUND BUTLER M.D. AND G. D. DELPRAT M.D. SAN FRANCISCO

THE following case is we believe of interest because it was encountered quite free from any previous gastro intestinal disturbances

The family history was negative. For the past 12 years the patient has been a resident of Southern California recently enrolled as a college student. During childhood he suffered a mild attack of measles and mumps no sequela. At the age of 5 years he suffered from earache for about 4 months subsiding without drainage. Although not subject to sore throat he had the tonsils removed at the age of 9. He weighed 140 pounds and during the past 6 weeks has gained 6 pounds. He gives a history of no other diseases or infections.

For 6 weeks immediately preceding his admission to the hospital patient had been attending the Reserve Officers Training Camp at Camp Lewis Washington and had enjoyed the best of health. During this time he led an active and strenuous life and was not fatigued. On the morning of June 26, 1924 he started from Camp Lewis to Los Angeles in a Ford reaching San Francisco on the 27th at noon having driven all day and all night. While on the journey he states that he hardly stopped for meals. About 11 p.m. June 27 he was awakened by a sudden cramplike pain of great severity in the umbilical and left hypochondriac region. He immediately experienced a feeling of nausea and vomited the food eaten at the previous meal. The pain continued in severity but was now confined to an area as large as his hand around and over the umbilicus. During the next 3 or 4 hours this pain continued with occasional knife-like exacerbations without radiating. At the end of this time the pain seemed gradually to extend to the left costal margin after a short interval it spread down the left flank into the lumbar and hypogastric regions. It remained unabated until the patient entered the hospital. There was no radiation of the pain to the genitalia to the back or shoulder. There were no remissions.

Examination at the Emergency Hospital showed a young adult male 21 years of age suffering abdominal pain. There was slight flushing of the face. Patient quiet perfectly oriented and answered questions readily but was in continuous pain.

General examination was negative except for the abdomen. Respiration 24 pulse 90 in good quality. The abdomen when first examined showed spasticity of the left abdominal muscles which in a short time spread to the entire abdomen. Light pressure in the left upper and left lower quadrants of the abdomen

was very painful but in the right lower quadrant tenderness was most marked. A rectal examination showed marked fullness in the pelvis with extruding pain from pressure on the pelvic peritoneum. The rectal temperature was 100 degrees F. The leucocyte count was 12,500 with 89 per cent polymorphonuclear and 11 per cent lymphocyte elements. The hæmoglobin was 80 per cent. Urinalysis showed the urine straw colored acid with specific gravity of 1.038 a slight cloud of albumin and an occasional granular cast in the sediment. The blood Wassermann report later came in negative.

Diagnosis With these findings the diagnosis of an acute inflammation of the appendix was made the appendix presumably pointing to the left along the base of the mesentery of the small bowel.

The patient was operated on under ether anaesthesia 11 hours after the onset of the symptoms through a right rectus incision. On opening the peritoneum we found a small amount of serosanguinous fluid. The appendix almost immediately floated into view the vessels were slightly engorged. It was evident that the appendix did not account for the patient's symptoms. On drawing the terminal ileum from the pelvis a quantity of fluid was released serosanguinous in appearance containing many blood stained flakes of fibrin. Complete exploration of the small and large bowel failed to reveal pathology. A second incision was made through the upper right rectus and an examination of the stomach duodenum and gall bladder gave negative findings. Through an opening in the gastrocolic omentum the pancreas was examined. The head neck and body were normal in appearance and to palpation in the region of the tail there was a mass the size of a mammoth walnut. The peritoneal surface in contact with this mass was edematous and blood stained. One small area of a possible fat necrosis the size of a small grain of wheat was found in the greater omentum. This enlargement consisted of the tail of the pancreas which was chocolate color with the glandular markings indistinct and blurred. Inasmuch as the pathological changes were localized definitely to the tail of the pancreas resection seemed the logical procedure. Great care was taken not to wound the splenic vessels which ran in a groove along the superior margin. The space left by the resection was drained by a cigarette drain coming out below the antrum of the stomach through the middle of the incision. Patient was returned to the ward in good condition. One half of the specimen was sent to the laboratory of the Surgical Division of the Stanford Service of the San Francisco Hospital the other half was sent to the Department of Pathology of Stanford University.

of the skin why should it occur here so often and nowhere else? It seems more likely that they are due to incomplete obliteration of a former canal and extending as they all do upward and posteriorly to the coccyx the medullary canal seems the most likely origin.

The branchial clefts are closed by the eighth week. As before stated the medullary canal has been seen open as late as the ninth week. Consequently the obliteration of the clefts in the one case and of the medullary canal in the other must take place at about the same period of intra uterine life with this difference that growth is more rapid and perfect in the upper part of the body and hence more favorable to closure of the clefts. If notwithstanding this sinuses and cysts occur in the neck and about the ears there is at least an equal chance that they may occur at the lower end of the medullary canal.

It would seem from a study of the sections from these fetuses that obliteration of the medullary canal takes place at first and most completely at the lower end of the sacrum and extends from this point in both directions.

As is well known the spinal cord at first extends the whole length of the vertebral canal but, as the latter grows the more rapidly in length the cord rises and the filum terminale is stretched thus favoring obliteration of the medullary canal at the lower part. The obliteration of the medullary canal between the end of the vertebral canal and the skin apparently frequently takes place in an irregular manner but for that matter the medullary canal in the spinal cord shows frequent irregularities sometimes existing as a distinct canal, sometimes double and often showing in sections only as a very irregular clump of cells.

Undoubtedly the majority of these remnants of the medullary canal become obliterated—only the larger especially those in which glands and hairs are present persisting as the depressions sinuses and cysts of extra uterine life and in all probability it is only the congenital sinuses and cysts which give rise to the suppurating sinuses.

On the other hand Stone believes that the skin and not the neural groove is the source of these sinuses and states "In spite of these

advantages no satisfactory explanation of the problem has yet been found. It is true that for a time a small cystic remnant of the lower most portion of the medullary groove persists and is known as the coccygeal medullary vestige. This is lined by a single layer of columnar cells and is doubtless the structure to which Hermann and Toureux have referred. Normally this little cystic structure has no opening communicating with the skin, and ultimately disappears. Furthermore its cell are similar in appearance to those lining the central canal of the spinal cord and in Doctor Streeter's opinion have already become so differentiated that they could not be expected later to give rise to skin even though the cystic remnant should persist. It is Doctor Streeter's view that pilonidal sinus must be regarded as a special local downgrowth of epithelium originating from the true skin and not from the medullary groove. The skin in certain regions forms organs like the breast and the external ear by just such an invagination. No suggestion is as yet advanced as to why such an invagination takes place occasionally in the coccygeal region. In short beyond the feeling that the skin and not the neural groove is the source of the sinus no facts are present to explain the origin of the lesion.

However the facts which have been advanced by Mallory are of sufficient importance to throw the weight of evidence in favor of his contention that these sinuses are developmental anomalies resulting from a partial closure of the medullary canal. Furthermore the case here reported shows an irregular fusion of the lamina of the first sacral vertebra an absence of the pinous process of the second sacral vertebra with a bony defect at the junction of the first and second sacral segments and an opening directly into the spinal canal which is additional evidence in favor of the view that these sinuses develop from a failure of the medullary canal to close in the normal manner.

SURGICAL DRAINAGE IN MENINGITIS

In a recent article Dandy (3) has reviewed the literature on the operative treatment of

Does the first report by the author
not all depend on the fact that here the
Euthanasia Commission is not a
lawyer but a physician?

REGISTRY OF BONE SARCOMA

PART I—TWENTY FIVE CRITERIA FOR ESTABLISHING THE DIAGNOSIS OF OSTEOGENIC SARCOMA

PART II—THIRTEEN REGISTERED CASES OF FIVE YEAR CURES ANALYZED ACCORDING TO THESE CRITERIA

BY E. A. CODMAN, M.D., F.A.C.S. BOSTON

INTRODUCTION

ONE of the primary objects of the registry was to keep an up-to-date list of living cases which had had bone sarcoma and which could be considered as cured. It should be remembered that the Registry was started for and by the family of a patient under the care of the writer for a supposed bone sarcoma. They wished and I wished to ascertain the actual facts as to whether there were any living cured cases of this disease and if there actually were to ascertain the methods of treatment by which these patients had been cured. I was given a thousand dollars to pay my expenses in obtaining the required facts.

My first step (in August 1920) was to address a circular letter to the individual members of the American College of Surgeons and to the surgical profession in general. The advice of Dr. Ewing and Dr. Bloodgood was sought in consultation. Through the kindness of my personal friends in several earnest clinics follow-up investigations were started. In fact that gift of a thousand dollars made me and many others work and soon led the Regents of the College to add an aggregate of \$8000 more contributed from time to time in order to answer these two simple questions. Now at the end of five years only 17 cases of primary malignant bone tumors have been collected which in my opinion may be considered cured (Ewing's tumor 4 cases - osteogenic sarcoma 13 cases).

In spite of all our efforts my patient died within the year and autopsy showed that the supposed sarcoma was a metastatic cancer of unknown origin. The chagrin of the error in diagnosis was somewhat allayed when reports from various clinics stimulated by our investigation began to appear. Greenough, Simmons and Harmer analyzing the cases from the Massachusetts General Hospital and

Huntington Memorial Hospital for instance, reported. Perhaps the most surprising fact of the whole study is that of 148 cases sent in as possible bone sarcoma only 68 could be considered in fact to be cases of malignant newgrowth of bony origin, the remaining 82 cases proving on more detailed study to be metastatic tumors of bone (29 cases), sarcoma primary in the soft parts (28 cases), inflammatory conditions (11 cases) or tumors of a non-sarcomatous type (14 cases).

It soon appeared that by products were to be the result of our industry rather than the intended product of obtaining the answers to our simple questions. The Registry itself was a by-product for when our collection of cases could no longer be of possible benefit to my patient the Regents saw that the same questions would be eternal. The friends of future patients would always want to know of the living cases and how they were cured. Five years have passed since the first circular letter went out and some of our by-products may be listed as follows:

1 Many contributions to the medical literature on bone tumors.

2 A more or less acceptable standard classification presented and discussed in the form of a small book. (Reprinted in Bull. Am. Col. of Surg. 1926 v. No. 1 A.)

3 The impersonal proof of Dr. Bloodgood's contention that giant cell tumor is benign.

4 The impersonal proof that cases of giant cell tumor may be cured by radiotherapy.

5 The diffusion of Dr. Mallory's contention that benign giant cell tumor is not a neoplasm but a faulty repair phenomenon.

6 The impersonal proof that many of the cures from combined treatment by surgery, mixed toxins and radium claimed by Dr. Coley are authentic.

HERNIA IN THE BROAD LIGAMENT FROM THE CLINICAL VIEWPOINT

REPORT OF A CASE AND A REVIEW OF THE LITERATURE

By LOUIS DUNN, M.D. MINNEAPOLIS, MINNESOTA

ONLY four histories of hernia in the broad ligament have been recorded. It is thought desirable to bring these together and to add a fifth one thus making the subject more complete.

The extreme rarity of this condition, its seriousness, the necessity for prompt intervention, the value of a more general knowledge of the situation of this form of hernia which usually comes under treatment for acute intestinal obstruction, and the importance of the treatment which should be employed are the motives for the presentation of this article with the report of the case that came under my care.

ANATOMICAL CONSIDERATIONS

The broad ligaments of the uterus are extensive fibromuscular planes extending from the lateral borders of this viscus to the walls of the pelvis. The round and the utero-ovarian ligaments form parts of this structure. The peritoneum is thrown over all like a mantle. The round ligament makes a prominence under the peritoneum but it does not project sufficiently to form a meson. Where the peritoneum covers the utero-ovarian ligaments it forms a short meson and a similar structure, the mesosalpinx, is produced where it surrounds the fallopian tube. One of the more practical points in the consideration of broad ligament hernias is the division of the upper posterior surface of the ligament into two spaces by the utero-ovarian ligament with the border of the ovary. These structures divide this surface unequally into an upper triangular portion, the mesosalpinx, and the lower part, the mesometrium, which passes medially to the side of the uterus.

HISTORICAL

No record of this condition was published prior to 1917 although Barnard (1) had stated

that hernias may occur in pouches of the broad ligaments and Moynihan also mentioned this possibility.

In 1917 Fagge (3) described two cases. Barr (2) reported a third case in 1900 and Pidcock (5) a fourth one in March 1924. It is evident that this condition has been observed more frequently than it has been reported. Of the five cases of hernia in the broad ligament two were found in adventitious pouches and three through openings in it.

Fagge's two cases were incarcerated in pouches within the broad ligaments. One was on the left side below the utero-ovarian ligament and the other on the right above. In 3 cases the hernias were through openings, one under the left round ligament and two through openings in left mesosalpinx. The lengths of the incarcerated intestines were 2 inches, 1 inch, 15 inches (author's case) and 8 feet respectively, the last requiring resection.

ETIOLOGY

These histories show one patient unmarried and four married and with children. In one of the latter obstruction occurred on the fourteenth day following delivery. In this instance the intestine passed under the round ligament. In two other cases the intestine was found in an opening in the mesosalpinx. One patient had fallen down stairs 14 years before operation but the obstructive symptoms followed straining at stool. Another dated her symptoms from a fall from a chair 15 years before. She never experienced obstruction only a pain when lying on the left side.

The intestine in these five cases entered the openings from above and behind. This is the plane which the broad ligaments present to the intestines and upon which the intra-abdominal pressure would be exerted in developing a fossa in a weakened spot in the broad ligament or stretching a congenital opening.

ated to register any case of bone sarcoma in which the patient is living whether cured under treatment or moribund and especially if cured 5 years ago!

And yet anyone in searching the literature will find many reports of cures and percentages of cures. Read again the above quotation from Greenough Simmons and Harner and reflect on the percentage of erroneous diagnoses compared with the percentage of cures.

However, the paragraph in italics does not give all our optimism for it is boiled down to the coldest hardest facts. We have other evidence that all of these therapeutic agents amputation, Coley toxins and radium are effective in greater or less degree. There are a few more cases remaining well 5 years which we almost accept. There are many 5 year cures in cases which we consider benign giant cell tumor and a considerable number of cases of osteogenic sarcoma are nearing the 5 year limit. We are confident that each year in the future the report of the Registrar will be more favorable—particularly in regard to the use of radiation.

The Committee of which I was Registrar will be abundantly satisfied if they have succeeded in establishing a moderately acceptable standard nomenclature and moderately acceptable criteria of malignancy. To recommend an absolute nomenclature or absolute criteria would be ridiculous. Nevertheless nomenclature and criteria must precede statistics on therapeutics.

PART I—TWENTY FIVE CRITERIA FOR ESTABLISHING THE DIAGNOSIS OF OSTEOGENIC SARCOMA

Our list of 17 cured cases applies only to primary malignant tumors of bone that is to our classes of osteogenic sarcoma (13) and of Ewing's tumor (4). Of the latter I shall say little because there is at this writing an article in press for the *Archives of Surgery* by C. L. Conner which analyzes all our cases of Ewing's tumor and really gives the most up-to-date knowledge of this new entity. The four 5 year cures of Ewing's tumor No. 185 No. 267 No. 348 No. 398 will there be reported. They will also be reported from the Memorial Hospital Clinic of New York by Coley and

some have already appeared in the literature in Ewing's articles. As will appear in Conner's critical analysis Ewing's tumor is in a class by itself as far as prognosis under radiation is concerned. It was this favorable response to radiation which first led Ewing to see that it was a separate entity apart from true osteogenic sarcoma.

Before speaking individually of the 13 remaining cases of supposed 5 year cures let us consider the criteria of malignancy in osteogenic sarcoma. Out and out cases of malignant osteogenic sarcoma will show every one of these points although occasionally one or two may be doubtful absent, or impossible to verify (Table I).

HISTORY

Nearly all histories of osteogenic sarcoma cases conform to the following five points.

1. *Onset* The onset is with pain before tumor is noticed or pathological fracture occurs. The patient may not consult his physician until the tumor appears but in that case careful questioning will bring out the history of previous pain perhaps intermittent in character. History of preceding trauma is frequent but always open to the question of whether the trauma caused the lesion or only called attention to it. Pathological fracture is common as the first symptom in carcinomatous metastases or in benign central lesions as cysts and giant cell tumors but so rare as to be merely the exception which makes the rule in osteogenic sarcoma. Late in the disease it is not very uncommon. *It may say therefore that unless pain precedes other symptoms we may suspect that the case is not one of osteogenic sarcoma.*

2. *Duration* We rarely get a history of years. Not infrequently the symptoms have existed about a year before the patient seriously seeks medical advice but it is very rare that a patient allows 2 years to elapse. On the other hand it is very unusual for a patient to seek advice before at least a month has elapsed. The pain is usually bearable at first. The earliest case which we know of had had pain for a little less than a month. In benign osteogenic tumors the history is usually of years.

of small intestine that was fixed in the left pelvis (ood exposure disclosed 15 inches of intestine projecting through an opening in the mesosalphinx. This opening was approximately 5 centimeters in diameter and was of sufficient size readily to permit the withdrawal of the intestine. It was limited anteriorly by the tube and posteriorly and to the inner side by the attenuated utero ovarian ligament and the ovary. The aperture was closed with chromic catgut. The needle was passed very close to the edge of the opening which drew the tube to the side of the uterus. Further examination of the pelvis located a similar opening of the same size in the right broad ligament. This aperture lay between the tube and the utero ovarian ligament. No intestine occupied this opening but the appendix extended parallel with and was attached to its lower margin. The proximal end of the appendix was attached to the posterior edge of the bernal opening the end pointing to the right. It was removed and the opening in the mesosalphinx obliterated as on the left side. A survey was made of the pelvis and since it was found that the left tube had become cyanotic from impairment of its blood supply it was removed. The right tube was examined again and its circulation seemed unimpaired.

The convalescence was uneventful the patient returning home at the end of 4 weeks. However on the way from the hospital she developed an intense pain in the right iliac region. This pain with an elevated temperature continued for a week. A vaginal opening was then made into the right broad ligament at the point of induration and tenderness. This released a considerable quantity of serous exudate but no pus. The patient made a rapid recovery and has been well since. This postoperative disturbance was doubtless due to interference with the blood supply of the right tube.

It is an interesting speculation as to the length of time the intestine had occupied the opening in the broad ligament. It is conceivable that with the fluid content of the small intestine such a condition was possible without obstruction occurring during the period of years she suffered following the injury. The fact that she was comfortable when pregnant and has been completely relieved since the operative obliteration of these stomata supports the inference that the intestine probably occupied the ostia in the broad ligament the greater part of this time for when she lay on her left side she always had pain.

CASE 2 (Pidgeon). Mrs. V. age 34. Fourteen days previous to entering the hospital she had a normal labor the pregnancy and puerperium being without incident. While bathing her baby she was seized with sudden and violent pain in the region of the navel. The pain was continuous and very acute. Two hours later vomiting began and recurred at intervals all afternoon. No feces or gas passed after the onset of symptoms. A ventral hernia never larger than a pigeon's egg had existed on the left side for 3 years. This always disappeared when she lay down. It was not present at the time of

examination and was probably inguinal. Her temperature was 97.5 degrees her pulse rate 65 and very weak. She complained all the time of agonizing abdominal pain. The face was cold and beaded with sweat. The abdomen was lax with no distention nor visible peristalsis. Some fluid was present in the flanks. Slight tenderness and rigidity were discovered in the lower part of the left iliac fossa. No mass was felt.

The diagnosis lay between an acute perforation and acute intestinal obstruction. The latter seemed more likely.

On opening the peritoneal cavity free bloody fluid escaped the abdomen being apparently filled with plum colored coils of small intestine. The cecum was collapsed but otherwise healthy. A band was felt rather to the left side and in front of the uterus. This was divided between forceps relieving thereby the strangulated gut. A small artery was distinctly seen in the center of the cut band. Careful investigation showed the strangulating agent to be the left round ligament one end of which was traced to the internal abdominal ring and the other directly to the uterus. The ligament measured 4 inches in length and before division the middle 2 inches were quite free from the broad ligament. There appeared to be no evidence of old pelvic inflammation such as might give rise to adventitious bands surrounding the round ligament. The coils of strangulated intestine were evidently on the verge of gangrene and required the excision of 8 feet of the small gut. The convalescence was stormy and on the seventeenth day necessitated the reopening of the abdomen with drainage of an abscess localized between coils of intestine. Fourteen days later a perinephric abscess required evacuation. From this time on convalescence was without further incident.

CASE 3 (Barr 2). Mrs. L. H. age 41. Mother of seven children youngest seven years. She had had four miscarriages and had not menstruated within 8 years. Her previous health had been good. On January 15 1920 she was suddenly seized with a severe pain in the epigastrium. This was more severe to the left of the median line and radiated downward to the left pelvis. Her physician found the most sensitive point to be to the right of the median line and over the gall bladder. The pain was general throughout the abdomen although more severe at the point named. It was constant with accentuations at short irregular intervals. Nausea and vomiting were prominent symptoms. Morphine was administered for the relief of pain. A diagnosis of gall stone colic was made and concurred in by three physicians.

Barr saw her on January 17, the third day following the inception of the attack. At this time the patient was suffering excruciating pain throughout the abdomen although it was most intense to the left of the median line in the left pelvic region. There was excessive and persistent nausea with vomiting on taking food or fluids. Moderate abdominal rigidity was present. There had been no

4 *Age* With the exception of cases which also have Paget's disease 12 in number we have no instances of osteogenic sarcoma in a patient over 50. Paget's disease rarely occurs before 50. As recently computed by Bird and Sosman the incidence of osteogenic sarcoma in Paget's disease is 12 to 14 per cent (personal communication). In the recent Survey of bone sarcoma cases in Massachusetts the writer concluded that the incidence of bone sarcoma is about 1 to 100,000 in the population at one time.

Therefore in any patient over 50 who does not have coincident Paget's disease we may suspect the case is not one of osteogenic sarcoma.

5 *Rapidity of growth* Benign osteogenic tumors (N.B. this does not mean benign giant cell tumor) may be exceedingly slow in growth the change not even being noticeable from year to year they may however have periods of increase of growth but this is seldom rapid enough to be noticeable month by month—rather year by year. Inflammatory conditions often noticeably enlarge day by day and very often week by week. Osteogenic sarcomata as a rule show steady enlargement practically always noticeable in a month.

Therefore we may suspect that a case is not one of osteogenic sarcoma if the enlargement has been noticeable day by day or week by week or has not been noticeable month by month. This statement of course excludes cases subjected to the modern therapeutic test of radiation.

EXAMINATION

Cases of osteogenic sarcoma nearly always conform to the following five points in examination.

1 *Immobility of soft parts* Of course this is a difficult point to determine but one in which experience readily teaches. Rarely does an osteogenic sarcoma permit one to feel the soft tissues roll over the bone as does a giant cell tumor or cyst. This point is reversed in the inflammatory conditions which when they have perforated the bone may cause as much or more fixation of the soft parts than osteogenic sarcoma. Under the microscope there is a marked increase of large vessels in the periphery about an osteogenic sarcoma. There are often huge dilated superficial veins. I be-

lieve this peculiar fixation of the soft parts may be due to the ramifications of these new vessels.

Therefore we may suspect that a case is not one of osteogenic sarcoma if there is clearly mobility of the soft parts over the tumor.

2 *Location* Approximately one half of all osteogenic sarcomata occur in the femur one quarter in the tibia one half of the remainder in the other long bones. Of the other bones in the skeleton the phalanges of fingers and toes the carpal and most of the smaller tarsal bones appear to be exempt. Osteogenic sarcoma is rare in the shaft of a long bone but this situation is the customary one for Ewing's tumor or for carcinomatous metastases and myeloma.

Therefore the situation of a tumor may make us suspect that it is not an osteogenic sarcoma if it is not in one of the known usual sites and the suspicion is in inverse proportion to the frequency of occurrence at its site.

3 *Inflammatory signs* In exceptional cases the usual signs of inflammation may occur in osteogenic sarcoma they are not at all unusual in cases of Ewing's tumor. Radiation may temporarily produce them. However the typical osteogenic sarcoma does not present especially in its early stages, pronounced fever, tenderness, redness, leucocytosis etc. Nevertheless these cases are usually mistaken for osteomyelitis.

Therefore unless the signs of inflammation are absent or very mild we may suspect that the case is not one of osteogenic sarcoma.

4 *Condition of neighboring joints* The dissection of specimens of osteogenic sarcoma shows that it rarely invades the neighboring joints until late in the course of the disease or unless as a sequence to fracture or operation. Joint cartilage seems to act as a barrier to both benign giant cell tumor and osteogenic sarcoma. The latter almost invariably proceeds actually to the cartilage while the former often leaves a considerable amount of spongy bone between it and the cartilage. The presence of an osteogenic sarcoma near a joint does not involve the motion of the joint except in proportion to the fixation of the soft parts. Such limitation as there is is not due to spasm as is the case in inflammatory conditions of the

of small intestine that was fixed in the left pelvis. Good exposure disclosed 15 inches of intestine projecting through an opening in the mesosalphinx. This opening was approximately 5 centimeters in diameter and was of sufficient size readily to permit the withdrawal of the intestine. It was limited anteriorly by the tube and posteriorly and to the inner side by the attenuated utero ovarian ligament and the ovary. The aperture was closed with chromic catgut. The needle was passed very close to the edge of the opening which drew the tube to the side of the uterus. Further examination of the pelvis located a similar opening of the same size in the right broad ligament. This aperture lay between the tube and the utero ovarian ligament. No intestine occupied this opening but the appendix extended parallel with and was attached to its lower margin. The proximal end of the appendix was attached to the posterior edge of the hernial opening the end pointing to the right. It was removed and the opening in the mesosalphinx obliterated as on the left side. A survey was made of the pelvis and since it was found that the left tube had become cyanotic from impairment of its blood supply it was removed. The right tube was examined again and its circulation seemed unimpaired.

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4 *Osteolytic or osteoblastic or both* A typical X ray of a case of osteogenic sarcoma shows that the tumor is both osteolytic and osteoblastic. However, in rare cases, particularly if far advanced, these tumors may be only osteolytic or only osteoblastic. If wholly osteolytic the suspicion of metastatic carcinoma is aroused and if wholly osteoblastic of a benign osteogenic tumor. In most cases characteristic radiating spicules are shown and form a very positive sign, although exceptionally metastases or inflammation may produce them. The frequency of this sign of spicule formation is not enough to form a rule and the absence of it is not very strong evidence against osteogenic sarcoma.

Therefore unless the X ray shows that the tumor is both osteolytic and osteoblastic or if it shows that it is wholly one or the other, suspicion that it is not a case of osteogenic sarcoma is aroused.

5 *Involvement of soft parts* This is a difficult point on which to interpret the X ray. Giant cell tumors which have burst their capsule have frequently been interpreted as having the soft parts involved, and yet dissection in such cases has never shown this form of tumor as actually invading the soft parts, although it may push them aside on fascial planes. Vice versa the X ray of an osteogenic sarcoma may lead us to think it has not involved the soft parts and dissection will show that it has. If we define the 'soft parts' as including the extracortical space between the raised periosteum and the bone as shown by the reactive triangle above alluded to at its upper limit, we may get much help. Dissection shows that when we find this condition the tumor is always at least subperiosteal and usually has broken through the periosteum and begun to invade the soft parts.

Therefore we may say that a tumor which does not show in the X ray either invasion of the soft parts or the reactive triangle is perhaps not an osteogenic sarcoma.

MICROSCOPIC CRITERIA

The microscope gives also a pretty definite criteria common to most osteogenic sarcomata.

1 *Mitoses and hyperchromatism* The relative frequency of mitotic figures has long been

a guide in estimating malignancy in all tumors. Rapid growth in most tissues is characterized by a relatively large number of mitoses. Like other criteria this one has its exceptions for numerous mitoses may occur for instance in fungating granulation tissue and also in certain benign tumors. In benign giant cell tumor for instance they are often quite numerous and if an operation has been done and the wound is fungating they are usually very numerous. On the other hand excess of mitotic figures is a very constant finding in typical osteogenic sarcoma. Hyperchromatism of nuclei is a parallel phenomenon probably equivalent to mitotic activity or at least indicative of it. Sometimes it is seen without it and yet it indicates it.

Therefore the finding of numerous mitoses in a bone tumor does not necessarily indicate osteogenic sarcoma, but absence or infrequency of mitotic figures should arouse the suspicion that the case is not one of osteogenic sarcoma.

2 *Pleomorphism* All our instances of osteogenic sarcoma which have run a malignant course showed this criterion constantly. The degree of pleomorphism is of course a matter of individual judgment. There is a normal range of variations of size and shape in normal cells which it requires experience to recognize. In some cells the range is great for instance the endothelial leucocyte is protean in its ability to change in shape and size. In general a bone tumor must be considered within normal limits of pleomorphism if no cells are found which cannot be duplicated in normal inflammation. This is the rule in benign giant cell tumors for none of the 100 standard tumors of this kind in the Registry series contain even small numbers of distinctly atypical cells. On the other hand our series of osteogenic sarcomata all do. Living's tumors are not pleomorphic and yet are very malignant.

Probably the best single way in which to grade osteogenic sarcomata would be to base the prognosis on the degree of pleomorphism. This is equivalent to expert histologic opinion for any good histologist probably bases his opinion of the prognosis in any malignant tumor largely on its pleomorphism although he takes account of the other factors as mitotic activity, hyperchromatism

A diagnosis of appendicitis was made. Abdominal incision exposed a healthy appendix. The small intestine was somewhat distended with an abnormal amount of clear fluid in the peritoneal cavity. A coil of the lower ileum was fixed to the back of the right broad ligament leading to a blue cyst-like body in the substance of the broad ligament. The upper margin of the hernial orifice in the broad ligament was cut with scissors releasing 2 inches of ileum. The operator could now demonstrate that the pouch into which the intestine had passed was above the ovary and its ligament and that by the division of its neck it had been converted from a sacular pouch into a shallow fossa incapable of encouraging a similar retroperitoneal hernia. The operator did not think its obliteration by suture necessary.

The patient made an uninterrupted recovery.

TREATMENT

Treatment resolves itself in cases which develop acute obstruction into the release of the incarcerated intestine and the obliteration of the sac or fenestra. In Fagge's first case a large pouch was closed by suture. Several months later when the abdomen was reopened it was noted that the hernial opening had remained closed. In his second case the fossa was so shallow that it disappeared when the constriction was cut. Hernias under the round ligament should be released by cutting the constriction and repaired as indicated by the condition found. When the intestine passes through an opening in the mesosalpinx the tube may be resected if the patient is past the menopause. Or if pregnancy be possible the broad ligament may be cut below the fibrous end liberating the tube and permitting it to swing freely in the pelvis. I doubt the propriety of suturing the opening if it is large

as the blood supply of the tube may be impaired by angulation. It is desirable to perform these operations under local anesthesia when intestinal obstruction has occurred because of greater safety to the exhausted and prostrated patient and because of the 'negative abdominal pressure' which may be secured.

SUMMARY

- 1 Broad ligament hernias are extremely rare
- 2 The etiology of broad ligament pouches and fenestra is unknown
- 3 Congenital malformation or postnatal trauma may be the contributing factors
- 4 Hernias in the broad ligament frequently produce obstruction and this obstruction is the usual cause of symptoms and the necessity of intervention
- 5 These hernias more frequently occur in women who have borne children but may follow labor or may be found in primiparae
- 6 The fact that hernias in the broad ligament may cause disability or obstruction demanding surgical relief must be kept in mind

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Experienced pathologists have of course, noticed these vessels as the vascular arrangement of tumors in general but so far as I know they have not contrasted this vascular arrangement with the interstitial blood supply of giant cell tumors. Perhaps "vascular arrangement" is a better heading than "tumor vessels" which I have used hitherto.

GENERAL CRITERIA

There are five general criteria of malignancy in a bone tumor which seem to me important:

1. *The nature of the pathological examination.* For instance the most expert pathologist will not be able to give us as much help on the stony bit of dried tissue handed him by some uninterested operator as can a keen surgeon in an out-of-the-way clinic who has made a complete and careful examination and description of the amputated limb. Opinion based on careful examination of the dissected gross specimen by a competent pathologist or by a good surgical observer is very strong evidence for osteogenic sarcoma. Yet it is by no means absolute.

We have two gross specimens in the Registry Collection which have not yet been satisfactorily classified. For example Case 187 which is claimed as a cured case of osteogenic sarcoma by Ewing and Coker. I have not included in the present list although Dr. Ewing examined the gross specimen and still possesses it. From the situation of the tumor in the lower end of the radius and from Dr. Ewing's own description I suspect it to be a variant of giant cell tumor.

Nevertheless we may say that if the diagnosis is confirmed by competent examination of the gross specimen it is one of the strongest but not an absolute criterion. If other important criteria do not agree the suspicion is aroused that the tumor is not an osteogenic sarcoma. Further more histological reports even by excellent pathologists on small and imperfect exploratory specimens should not be accepted unless in agreement with other important criteria.

2. *The quality of the data.* What has been said in regard to the character of the pathological data applies to the other data. A history taken by someone interested in the patient or in the bone sarcoma problem is

likely to be much more fruitful than if carelessly taken by someone interested in neither. Our best histories have come from either the small hospitals where the patient is of paramount interest or from the occasional man in some large clinic who is interested in bone tumors.

The character of the roentgen data is of great importance. There is a deplorable tendency to neglect technique in bone cases. The greatest possible detail is needed and if attained may be of more importance to the patient than the surgeon's knife. Undoubtedly we must look to the roentgenologist to find the criteria of diagnosis at the early stage when pain has begun and tumor has not yet appeared.

We may say then that the quality of the data has much to do with our conviction of the diagnosis of osteogenic sarcoma.

3. *Unanimity of the different specialists.* In typical instances of osteogenic sarcoma the clinician, the roentgenologist, the operator, and the pathologist all arrive independently at the same diagnosis. As our experience progresses and knowledge diffuses, this rule becomes more striking.

A patient entering a hospital which has co-operated in the work of the Registry will probably have his bone tumor independently diagnosed by the different departments. If one has doubt all should have and probably actually have. General agreement however will be the rule.

To express this differently, any hospital which is doing its best for cases of bone tumor will promptly diagnose the majority of cases of osteogenic sarcoma independently in each department concerned and the synthesis of these opinions and the action to be taken on them will be the responsibility of someone familiar with the work of the Registry.

4. *The Registry classification.* A criterion of more or less value in regard to the diagnosis of a case of osteogenic sarcoma is whether or not it has been so accepted by the Registry Committee. This is neither final nor fundamental and merely represents the best obtainable collection of opinions on such data as is furnished at a given date. Any hunter knows the difficulty of distinguishing game

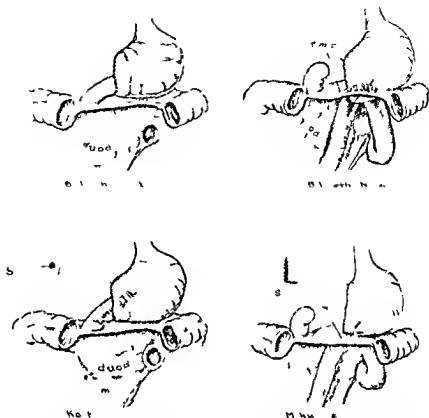


Fig 1 Older methods of partial gastrectomy. Billroth I end to end union with duodenum anastomosed in lower part of gastric incision. With original technique this was followed by leakage at so-called fatal angle. The opening may contract and become occluded. Billroth II End of stomach and duodenum closed followed by separate anterior—or as shown a posterior gastrojejunostomy. Koehler method. A modification to avoid the fatal angle of Billroth I. End of stomach closed and end of duodenum anastomosed to posterior wall of stomach. Now practically obsolete. Mikulicz method designed to obtain dependent drainage. End of stomach closed jejunum anastomosed to adjacent greater curvature. Rarely used. S—Stomach TMC—Transverse mesocolon

anastomosis may be relieved by bringing back over the line of suture the reflected peritoneal layer and tacking it to the anterior wall of the stomach so as to hold the gastric stump well to the right. Much support also may be obtained by uniting the divided edges of the gastrohepatic and the gastrocolic omenta to their respective duodenal extensions and the line of suture in the serosa may be further reinforced by a covering of omentum. We have not seen separation of the suture lines from tension and with the use of proper mobilization and support it should rarely occur.

Altogether we would estimate that tension will prevent a safe end to end suture in less than

10 per cent of patients after partial gastrectomy. Secondary closure of the anastomotic opening has occurred after gastrectomy by the Billroth I method and after various forms of gastro-enterostomy. It is our opinion that in the former operation it has depended largely on the failure of the surgeon to use the maximum opening that the duodenum permits. The use of clamps which tend to fix the diameters of the stomach and duodenum as well as to devitalize their walls may be blamed for some of the limitations that have marked the new opening. The fires of medical surgery are still alight for those who would divide the stomach only by strangling crushing

TABLE II - FIVE YEAR CURES - THIRTEEN CASES

Case	Reported by	Age	Sex	Site	Previous history	Date of onset	Date of operation	Tumor	Rad.	Result
9	H. B. d.	4	14	Tb.	0	6-15-06	7-9-05	0	0	Survived post op.
5	R. f. d.	0	44	Fm.	0	-09	Oct. 9-4	0	0	See S. & Ry. vol. p. 456
64	W. H.	0	0	Fm.	+	8-5-09	June 9-5	0	0	See Gynec. & Obst. p. 698
1	Bloodgood & Col y	F	3	Fm.	+	Aug. 7	Apr. 10-5	+	+	T. be. reported by Coley
1	Bloodgood	N. T.	4	Fm.	0	7-8-13	May 6-4	0	0	J. Rad. 3. 2nd Mar. p. 40
	Bloodgood	B.	1	Tb.	+	May 7	Apr. 10-5	7	7	J. Rad. 1. 0. Mar. p. 148
7	Col y	S.	10	Fm.	?	1	April 9-5	+	+	T. be. reported by Coley
84	C. l y	T.	16	Fm.	0	8-0-6	Oct. 9-4	+	+	T. be. reported by Col y
6	Th. m. w.	M.	1	Fem.	0	4-3-6	Oct. 9-4	0	0	See Cl. (N. Y. Am. J. p. Oct.
48	Col y	D.	8	Fm.	+	4-7-06	Aug. 7-05	+	0	T. be. reported by Col y
51	Bloodgood	S.	7	Fem.	+	5-3	Jan. 10-4	?	?	See app. end
55	Col y	F.	1	Fm.	+	9-3	Apr. 10-5	+	+	T. be. reported by Coley
51	Col y	1		Tb.		1	1	+	+	T. be. reported by Col y

cells the presence of many typical tumor giant cells with multiple mitoses and Dr. Mallory a original written report on the gross specimen. There is general agreement among the pathologists.

CASE 50. See Binnie's Surgery vol. 10 p. 456

This was a man of 44 with a very large tumor of the lower end of the femur. The case lacks some very important criteria. The age 44 was exceptional. There was little pain and tumor was the first symptom. The tumor had been present 5 years at least. It had differentiated largely to cartilage and bone and there was little cellular tissue. There are no X rays and no detailed description of the gross specimen. The diagnosis rests wholly on a few small areas which show a cellular growth with some mitotic activity and pleomorphism. Yet there is agreement among the pathologists on grading this as an osteogenic sarcoma rather than a benign or borderline chondroma. There are typical tumor giant cells.

The history however is strongly against this being a real case of osteogenic sarcoma. Patient has always been well except as to his left knee on which 3 years ago he first noticed a small lump on the outer side. This patient says was movable. Patient indicated that this was at the summit of the external condyle of the left femur. He knows of no injury save a slight blow at this point received some weeks before the lump was noticed. The lump has grown pretty continuously ever since although being stationary at times. It has never receded has never been painful but was tender at one spot on the upper side of the patella. There is some tenderness in walking. Patient says that he has rather gained weight recently than lost.

Patients with osteogenic sarcoma of the femur do not usually walk 3 years without

pain and gain weight. This is the exception which proves the rule unless the histological malignancy in this case is the exception which proves another rule.

CASE 64. This case was reported by Wells. Neither gross specimen nor X ray was preserved. There were marked inflammatory signs. Repeated operations were done which might well have diffused metastases.

The diagnosis is based on expert opinion on the slides and is not strongly proved for most of the tissue is obviously inflammatory. While agreeing in the diagnosis there is evident doubt among all the pathologists.

CASE 100. After two incomplete operations the thigh was amputated. She was also treated by Coley toxins and radiation.

This case fulfills all the criteria with the possible exception of differentiation. The tumor is so well differentiated that the sections closely resemble callus. Otherwise than this and the survival after so much surgery, the case seems a typical osteogenic sarcoma.

CASE 101. The questionable features in this case were its inflammatory nature, onset by fixation of joint rather than pain, the presence of many of the signs of inflammation clinically and in the sections, involvement of joint. No X ray is preserved and the character of the data is unsatisfactory. There is no agreement on classification among the pathologists except on the histological malignancy. There



Fig. 3. Partial gastrectomy with end-to-end union with expedients for producing a large stoma. 1. Portion of stomach to be resected. 2. End of duodenum stretched to produce direct end-to-end union. We have found this entirely feasible in a number of cases. 3. Superior or inferior edge of the duodenum split to form a large duodenal opening for direct end-to-end anastomosis. 4. Inferior edge of the duodenum split to form a large duodenal opening for direct end-to-end anastomosis. 5. Telescopic anastomosis; the puckering of the stomach is exaggerated in the picture. 6. Telescopic anastomosis; section showing the large funnel-like stoma produced.

anastomosis the lines of suture should of course be strong and well reinforced. For over a year we have employed a method of telescopic anastomosis.

TELESCOPIC ANASTOMOSIS

The method of telescopic anastomosis to be described has been used in ten cases, nine times for ulcer and once for ulcerated carcinoma of the greater curvature. One patient died from postoperative hemorrhage. The postoperative history of eight patients has been satisfactory.

Instead of an end-to-end junction of stomach and duodenum the duodenum is turned into the open end of the gastric stump after a high resection of the gastric mucous membrane and the outer serous surface of the duodenum united to the inner surface of the denuded muscularis of the stomach. The entire thickness of the cut end of the duodenum is united to the gastric mucosa. The superior strength of a union between muscle and peritoneum was observed by some of the early abdominal surgeons who after experimentation interposed peritoneum

Ewing's tumor in the *Archives of Surgery* but as in these cases there was confusion owing to coincident use of radiation

Of the present series of 13 in 5 cases amputation must be given the credit alone, unless the Murphy method of diffuse X ray is claimed to share one of these (Case 29) This idea of Murphy's seems to me to deserve more extended trial

In two other cases (102 and 501) we do not know whether the toxins were used or not

In 5 cases they were used before or after operation but in only one of these was radiation not used also

Finally in 1 case the cure must be credited to either toxins or radium or both This case was unique in many respects but clearly histologically malignant

Another point brought out is interesting In only 5 cases was the amputation done

at the same time as the exploration In the other 7 exploration was done at least once and in some cases several times before amputation Even if done only once it was done in a manner which should have caused diffusion of the tumor

In only 1 case was the amputation done without preliminary incision *but this was the most typical malignant case*

These facts speak in two ways either against the malignancy of these particular tumors or in favor of exploration being a harmless procedure

I have presented what I believe to be the best evidence of 5 year cures so far collected by the Registry We can continue to guess on the strength of these meager facts or we can co operate to collect a more complete series

Shall the College continue the Registry of Bone Sarcoma?

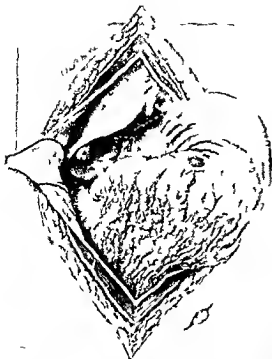


Fig 5 Ulcer of the anterior wall of the stomach attached to and invading the liver Case 9

the operation planned In the gastrectomy three lines of division of the alimentary tube are selected their position depending upon the pathological conditions that are found The first is a transverse line across the stomach well above the area of disease where the mucous membrane is to be divided The second line parallel with and to 7 centimeters below the first is where the outer layers of the stomach are to be divided The distance between lines one and two is the depth of the proposed invagination of the duodenum into the stomach Line three lies below the area of disease and indicates the plane for the division of the duodenum

The stomach and upper duodenum are opened in the usual way The peritoneum over the duodenum is divided near the pylorus and reflected to the right the upper duodenum freed usually to the pancreaticoduodenal angle with very careful ligation of all bleeding points Adhesions to the pancreas and other tissue and the vascularity of the region may render this part of the operation troublesome In freeing the lower end of the stomach the gastrohepatic and gastrocolic omenta are divided between ligatures to a plane at least 1 centimeter above line one The stomach

and duodenum having been sufficiently mobilized and all bleeding arrested by ligatures a soft or rubber-covered clamp is placed across the stomach just proximal to line one and a second clamp just distal to line two After suitable isolation by pads the stomach is divided proximal to the second clamp (Fig 6) and the mucosa removed from the open proximal part of the stomach up to the level of clamp one If there has been no preceding gastritis in this zone the mucosa will be found lightly attached to the overlying muscularis from which it is easily separated and removed by a pair of Mayo scissors (Figs 7 8) If adherent the mucous membrane may quickly be removed up to the line formed by the first clamp by a large sharp bone curette (Fig 9) The pyloric segment of the stomach is reflected to the right, and the left serous face of the duodenum several centi-

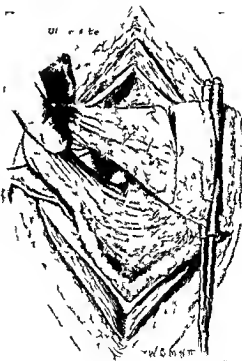


Fig 6 to 10 Telescopic gastrectomy Figure 6 shows the stomach and duodenum have been liberated and all distal vessels secured by ligature A rubber-covered clamp has been applied to the stomach on the line of proposed mucosal division and the stomach divided several centimeters below this point A clamp to avoid leakage may be applied to the lower segment of the stomach which is reflected to the right



Fig. 1 Diagrammatic drawing showing outline of the lower lumbar vertebrae and the sacrum. There is a sacralization of the fifth lumbar vertebra with an irregularity of the lamina and spinous process. The spine of the first sacral segment is flat and its laminae asymmetrical. Below this level the sacral elements are not fused and a bony defect is seen.

This case presented a sinus similar to the usual pilonidal sinus. It was situated over the upper end of the sacrum and was not a blind pouch but extended through a bony defect directly into the spinal canal. There was a history of irregular short intervals during which a thin watery fluid (presumably spinal fluid) escaped freely. This intermittent free drainage is quite possibly responsible for the fact that the patient had not suffered from meningitis at an earlier date.

The meningeal infection was apparently progressing badly under conservative treatment consisting of daily lumbar punctures and a single intraspinal autoserum injection. The sinus was excised and a laminectomy with drainage performed. Following surgical drainage the convalescence was uneventful and the patient was well when discharged from the hospital.

PORTAL OF ENTRY

Although congenital dimples, sinuses and cysts are commonly observed a review of the literature shows no instances in which such a sinus has been the portal of entry for a late meningeal infection. These fistulae are commonly known by the name of pilonidal sinuses.

This common lesion for which surgical advice is sought is a small congenital opening situated in the midline over the coccyx, the sacrococcygeal articulation or over the lower end of the sacrum. These sinuses practically always lead upward and toward the midline. They are lined with stratified squamous epithelium although this lining membrane is frequently absent due to an inflammatory

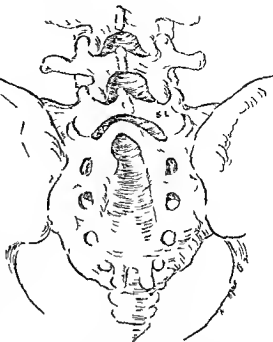


Fig. 2 Diagrammatic drawing showing the sinus extending from the skin surface directly into the subdural space through the bony defect below the lamina of the first sacral vertebra.

process. Not infrequently a tuft of hair is seen within these sinuses. As a rule a spinal fluid is not found.

There have been various theories advanced to explain the origin of these fistulae. These theories have been reviewed by Mallory (1) in 189 and Stone (2) in 1924. After studying a series of fetuses of 3 to 6 months old, the former author concludes that pilonidal sinuses arise from a persistence of the medullary canal. He states: "These cases show that in fetuses of 3 to 6 months there is very frequently present over the coccyx a canal lined with epithelium—in some cases connected with the skin—in others not—in some situated near the skin in others near the coccyx. The question naturally arises as to their origin. They may be due either to an extension inward of the epidermis or to the remains of some canal. If due to an extension inward or as Lannelongue assumes to the skin being bound down to the coccyx, why do they not contain the glands and hair follicles with which the epidermis in that region is studded? As regards an extension inward

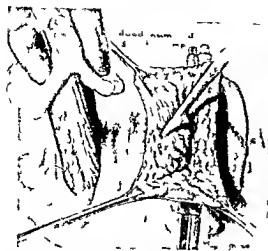


Fig 9 If the gastric mucosa is adherent it may quickly be removed by a large sharp bone curette. The soft clamp applied to the stomach causes the mucosa to be divided by the curette along a straight line.

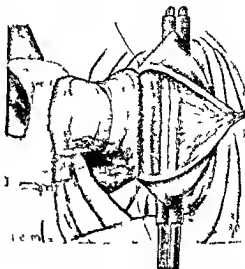


Fig 10 Showing edge of mucous coat of the stomach and protruding denuded muscular coats. Posterior semicircular suture in place.

plicated mucosa of the stomach fits well with the duodenal edge and a smooth funnel like opening from the stomach is formed with a large lumen.

The union is reinforced by uniting the gastrohepatic omentum superior to the line of anastomosis and the gastrocolic omentum inferior to the line of anastomosis to corresponding peritoneal and omental reflections of the duodenum in this way covering the pancreas and closing the lesser peritoneal cavity. The portion of the peritoneum reflected to the right in mobilizing the duodenum usually can be brought over the line of anastomosis and tacked to the anterior wall of the stomach to aid in holding the stomach well to the right (Fig 17).

As an excess of gastric mucosa is removed the operation produces the effect of a higher gastric resection upon the gastric acidity. With many adhesions about the duodenum or a very fixed duodenum the operation is tedious and difficult and in certain cases should not be attempted especially by the tyro in gastric surgery. Variations of the method may be used for gastro-enterostomy, other forms of gastrectomy and to reduce the functional capacity or acidity of the stomach as indicated in Figure 4. In the ten cases here reported an anastomosis of the type shown in Figure 3-5 was used in nine a long posterior and short anterior flap in one.

Hæmostasis should be absolute. In mobilizing the duodenum every bleeding vessel should immediately be ligated. Care should be taken in the first posterior row of sutures that the pancreatico-

duodenal artery running in the groove between the pancreas and duodenum is not transfixed. Serious bleeding may follow a needle puncture of this vessel. Exposure or resection of parts of the cortex of the pancreas as a rule is harmless. In several instances we have divided the duodenum first and placed the posterior row of serous sutures before resecting the stomach (Fig 18-19). An objection to this is the damage that may occur to the line of suture in resecting the mucous membrane from the stomach.

Anæsthesia. One patient received local anæsthesia supplemented by a little ether. Nine of the ten patients received spinal anæsthesia. As the duration of spinal anæsthesia is only 60 to 90 minutes it was supplemented in 8 cases by local anæsthesia with procaine adrenalin and in one case by 2.4 cubic centimeters of ether. The 200 cubic centimeters or more of the local anæsthetic solution used not only reinforced and extended the action of the intradural injection but also stimulated the patient and protected the vaso-depression from the root anæsthetic. All of the patients were more or less narcotized by preliminary scopolamin morphine injections. In one patient a thyrotoxic crisis resulted from the use of adrenalin in the local anæsthetic solution. Three of the patients had gastric ulcer, six duodenal ulcers, one an ulcerating carcinoma of the stomach. A small cigarette drain was used in three cases on account of oozing surfaces. I am entirely re-sponsible for the fatality of the series.

septic meningitis. He states that three types of treatment have been tried (1) intermittent drainage by repeated lumbar punctures (2) continuous drainage from (a) spinal canal (b) cisterna magna (c) pontine cisterna, (d) lateral ventricles (e) subarachnoid space (3) irrigation of subarachnoid space.

He believes that intermittent drainage can have only slight if any beneficial effect and calls attention to the fact that there have been a few scattered cases of spontaneous cure which casts some doubt whether many recoveries apparently resulting from one or another form of drainage may not have occurred in spite of rather than as a result of the treatment. He believes that mechanical injections may be harmful and even though there is no harmful effect that irrigations sufficiently frequent to be beneficial are impractical.

He advocates continuous drainage from the cisterna magna as the operation of choice and reports a series of four cases in three of which recovery followed such drainage.

In the case here reported the pathway of infection was through a congenital sacral sinus into the lower spinal canal with gradual extension of the infection upward. This of course gave a direct indication for surgical drainage in this region.

SUMMARY

The sacro lumbar region is a common site for developmental anomalies among which are included the above mentioned congenital dimples, sinuses, cysts and tumors. These cases

rarely present a connection between the spinal canal and the skin surface.

Other congenital lesions occurring in this region are instances of spina bifida with all gradations from an unnoticed spina bifida occulta with no external evidence of a defect to a fusion of the spinal cord with the integument. The cases showing a connection between the spinal canal and the exterior do not as a rule survive infancy.

The case herewith reported showed a congenital sacral sinus with an underlying spina bifida and a direct connection between the skin and the spinal canal. The occurrence in this case of a pilonidal sinus with an underlying spina bifida and an irregularity in the fusion of the sacral vertebrae is additional evidence in favor of the view that such sinuses are developmental anomalies resulting from a failure of the medullary canal to become completely obliterated.

This lesion had given the patient no cause for worry until the eighteenth year of his life when it served as the portal of entry for a meningeal infection.

A sacral laminectomy with drainage was performed with subsequent recovery from the meningitis.

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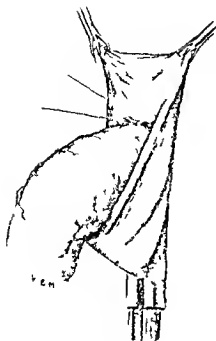


Fig. 13 Union of duodenum and gastric mucous membrane completed

lost 21 pounds. The abdomen was scaphoid without tenderness or rigidity. The X-ray report was ulcer of lesser curve near the pylorus.

Operation June 20, 1914. Spinal anesthesia by six centigrams of alcoholized stovaine in the twelfth dorsal interspace with local anesthesia by 1 per cent procaine to finish the operation. An upper right rectus incision was used. The stomach contained a number of ulcers, one 2 by 1.5 centimeters with step-like penetration into muscularis on the lesser curve midway to cardia, a second ulcer partially healed measuring 3 by 1.5 centimeters near the middle of the greater curvature, while several small ulcers with dirty greenish bases were found on the anterior wall near the greater curvature. The mucosa was very adherent to the muscularis and the removal of the mucous cuff by dissection was difficult. In this adherent type it was later found that a large curette was very effective to rapidly remove the mucosa. A short cuff was formed the stomach being resected proximal to the ulcer, the upper border of the duodenum split to enlarge its opening, and a telescopic union made with three rows of No. 0 and No. 00 chromic catgut. The appendix was removed. There was primary union and the patient was discharged on the thirteenth day after operation. Complications from gastric symptoms followed the operation until June 10, 1915, when the patient developed slight discomfort following food that has raised the question of residual or recurrent ulceration. The symptoms increased in intensity and in January 1916 the patient was asked to return for study and possible reoperation.

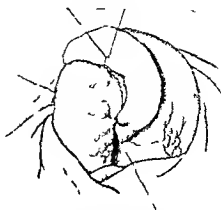


Fig. 14 Clamp removed to determine timing or leakage along suture line. Anterior row of interrupted sutures uniting outer surface of duodenum and denuded muscular coat of stomach being introduced.

CASE 4. Recurrent hemorrhage from duodenal ulcer. Telescopic partial gastrectomy and appendectomy. Recovery.

Mr. Charles A., age 35, electrician, referred by Drs. Rosen and Offens. Eleven years ago the patient had hæmatemesis with epigastric pain. This recurred 8 years ago and bloody stools were noticed 4 months ago. Last month he vomited 8 ounces of clotted blood. The appetite has always been good without distress from food. The skin is pale and itchy, with moderate anasarca and puffiness of the face. There is some pyorrhea and gingivitis. The pulse is 110 and there is a mitral systolic murmur. The urine shows a trace of albumin and a few fine granular casts and cylindroids. Leucocytes 8300. Polymorphonuclears 59, small lymphocytes 39, large lymphocytes 2, transitional 1, hæmoglobin 60-69, reds 3,890,000. Blood creatinin 1.5, blood chlorid 3.62 milligrams. A blood transfusion of 360 cubic centimeters was given September 9, 1914. The X-ray report is large 6-hour residue with deformity of the duodenal cap.

Operation October 20, 1914. Under spinal anesthesia with stovaine. Six drachms of ether were also used. A 14 centimeter upper right rectus incision revealed an ulcer of the posterior wall of the duodenum 4 centimeters from the pylorus with a crater measuring 2 by 1 centimeters. The lower third of the stomach and first part of the duodenum were excised and a telescopic anastomosis made with two or three rows of fine chromic catgut sutures. Primary union occurred and the patient was discharged 3 weeks after the operation. No recurrence of symptoms had followed up to June 1915.

CASE 5. Duodenal ulcer recurrent after a cholecystostomy and Finney pyloroplasty. Partial gastrectomy with telescopic union. Recovery.

Richard B., age 35, printer, has had gastric symptoms since 1914. In 1922 a duodenal ulcer with subacute perforation into the wall of the gall bladder of 2 weeks duration was treated with Finney pyloroplasty and a cholecystostomy. This operation was followed by a severe intragastric hemorrhage and late a splenic aneurysm. A few months after this operation the gastric symptoms recurred with marked gnawing sensation in the epigastrium 2 hours after meals. Later the pain became constant

It is interesting to consider the causes of these sacculations and stomata. No one discussed this phase of the subject except Fidecock. He investigated the bodies of ten adult females. He could stretch the round ligaments forward, thus demonstrating a thin avascular fold of peritoneum which joined that to the main part of the broad ligament. It required but little force to perforate this membrane with the finger. He suggests as a possible cause of the condition in his patient that all the structures connected with the uterus were in a relaxed condition as a result of the pregnancy and that a coil of intestine had in some manner ruptured this meso-ligamentous fold. This explanation is plausible but in my case it is probable that congenital stomata existed. This is suggested because both of the broad ligaments contained openings of about the same size which were symmetrical and with smooth edges. The appendix was attached to the lower border of the opening on the right side and no evidence existed of previous inflammation. It is also probable that the hernia with obstruction in Barr's patient occurred through a congenital opening.

Our knowledge of the embryological development of the broad ligament gives no clue to the production of congenital windows in this structure. No observation seems to have been made of openings or sacculations of either congenital or postnatal origin except those cases reported by Barr and myself.

DIAGNOSIS

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could be detected but no tumor could be outlined.

Non obstructive hernia into the broad ligament may be indicated by periodic pains. When the intestine passes through an opening certain movements or position of the body may pull on the mesentery inducing the same sort of pain produced by a tug on the intestine when the abdomen is opened under local anesthesia. The absence of pain during pregnancy is due to the closure of the opening, as the uterus ascends. The outstanding diagnostic fact to remember is that in acute obstructive conditions hernia into the broad ligament is one of the possibilities which should be considered.

We are fortunate to be able to illustrate by case histories hernias in these different situations showing the conditions that may be found and the treatment that was used in each instance.

CASE 1. The author's case. My interest in this subject was stimulated by a patient seen on January 30, 1910. She gave the following history. Mrs. H., age 44, married, was the mother of five children, four of whom were living and well. Her labors were without incident. In 1904 a chair on which she was standing tilted suddenly. She was thrown forward landing on her feet receiving such a jar that 3 days later she miscarried. Following this accident she had so much pain in the abdomen for a year or more that she could do no lifting neither could she hold a child in her lap. For the past 15 years she could not lie on the left side except when she was pregnant without causing an intense pain which if the position were not changed would extend over the entire lower abdomen. Reaching upward caused an acute pain followed by a sense of weakness which might last for some time. Sexual intercourse was uncomfortable during the past 4 years. Four labors and 10 miscarriages have occurred since the accident.

Nothing abnormal was found in the head, chest, heart or kidneys. There was neither dullness nor tenderness of the abdomen. A vaginal examination disclosed an old perineal laceration and a bilateral cervical tear from which there was a profuse discharge. The uterus was in normal position. Neither tumor nor induration was found to the right or posteriorly. However, there was an indefinable sense of resistance to the left which could not be definitely outlined. This area was not particularly tender but a dull ache followed the vaginal examination.

On February 1, 1910, under local anesthesia the cervical and the perineal lacerations were repaired and hemorrhoids were removed with clamp and cautery. The abdomen was opened in the median line suprapubically. The hand encountered a mass

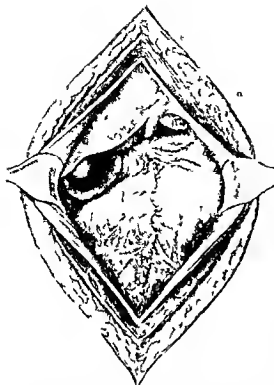


Fig. 17. Case 9 completed. The openings in the gastro-hepatic and gastroduodenal omenta have been closed by fine ligatures relieving tension. The portion of peritoneum reflected from the duodenum has been brought back over the anastomosis and attached by several interrupted sutures to the anterior face of the stomach also relieving tension on suture lines.

closed. Telescopic partial gastrectomy, secondary hemorrhage. Death.

Mr. John S., age 38, carpenter, referred by Dr. A. P. Butt. Gastric symptoms of several years' duration for which a posterior right loop gastro-enterostomy was performed in 1913. A few months after operation he died of a short time after eating recurred, and in November 1924 the patient was admitted to the hospital with a violent hemorrhage from the stomach. The patient shows a residual anemia from the loss of blood.

Operation January 19, 1925 in West Virginia. Spinal anesthesia and local infiltration in cocain anesthesia was used. Marginal incision was found at gastro-enterostomy opening from secondary ulcer. A shallow ulcer about 15 millimeters in diameter was also found in the first portion of the duodenum. The stoma was of ample size. The jejunum was disconnected from the stomach by the marginal ulcer, excised the openings in the stomach and the wall closed and the lower fourth of the stomach and first portion of the duodenum excised with a telescopic end-to-end anastomosis. Some oozing the source of which was not easily determined was noticed that was apparently controlled by a small sponge introduced deep into the abdomen above the anastomosis. The pad was replaced by a cigarette drain and

the abdomen closed. Duration of operation about 160 minutes.

Following the operation the pulse soon rose from 60 to 114 the patient vomited a small quantity of blood and belching there was oozing into the stomach. I counseled delay. A small blood transfusion was given but the symptoms increased and 8 hours after operation the patient began to extremis. Dr. Butt reopened the patient dying before the source of the bleeding was located.

In this case I used poor judgment in attempting such an operation in a new environment and upon an anemic patient. A two-stage operation would have been safer. The source of oozing should have been determined before the abdomen was closed. In a more recent case of oozing during the operation a puncture of the pancreaticoduodenal artery by the posterior row of sutures was found. The early postoperative shock should have been treated promptly by re-operation.

Case 9. Duodenal ulcer perforating into liver. Telescopic gastrectomy and appendectomy. Recovery.

Mr. Julius K., referred by Dr. John B. Rosby, age 44, salesman, has had attacks of indigestion for 25 years. Formerly these attacks occurred during the Spring and Fall and lasted about 1 week with food ease and hunger pain. For a month the pain has been almost continuous without relation to the type of food and without relief after eating. Periods of severe pain referred to the lower anterior chest preventing work occurred both day and night.

Operation March 12, 1925. Spinal anesthesia by 1 cc. cobolizol 1 cc. saline. 6 centigrams in the first lumbar interspace reinforced by local anesthesia with procaine adrenalin was used. Operation revealed an ulcer of the upper anterior wall of the duodenum close to the pylorus that had invaded the inferior surface of the right lobe of the liver (Fig. 15). Telescopic gastrectomy was performed with three rows of No. 0 and No. 00 chromic catgut sutures with removal of first portion of duodenum, one-fourth of stomach and a small portion of adherent liver. The appendix was removed and the defect in the liver sutured. The duration of the operation was about 120 minutes. Pulse at the close was 70. There was an uninterrupted recovery and the patient was discharged from the hospital on the fourteenth day. One and one-half months after operation the patient continued to have complete relief of symptoms and had gained 11 pounds. In excellent condition January, 1926.

Case 10. Duodenal ulcer with subacute perforation to the head of the pancreas. Telescopic gastrectomy. Postoperative thyrotoxicosis. Recovery.

Mr. Etece T., referred by Dr. H. I. Tye, age 45, single clerk. A tall lean man had complained of burning in the epigastrium for 3 years with hunger pain and food ease. Food usually gave relief for 2 or 3 hours. He had a severe attack of indigestion at Christmas 1924 when he was unable to work for 4 days. He has never vomited but has lost 20 pounds in the past 2 years. There is a symptomless adenoma of the left lobe of the thyroid the size of a small plum. On X-ray examination the stomach empties in 7 hours. The duodenal cap does not fill and an ulcer of the first portion of the duodenum is diagnosed.

Operation March 31, 1925 through an upper right rectus incision under cocaine spinal and procaine local anesthesia showed an ulcer of the posterior wall of the lower part of the first portion of the duodenum adherent to the pancreas. The head of the pancreas forming the base of the

It is interesting to consider the causes of these sacculations and stomata. No one discussed this phase of the subject except Pidcock. He investigated the bodies of ten adult females. He could stretch the round ligaments forward thus demonstrating a thin avascular fold of peritoneum which joined this to the main part of the broad ligament. It required but little force to perforate this membrane with the finger. He suggests as a possible cause of the condition in his patient that all the structures connected with the uterus were in a relaxed condition as a result of the pregnancy and that a coil of intestine had in some manner ruptured this meso ligamentous fold. This explanation is plausible but in my case it is probable that congenital stomata existed. This is suggested because both of the broad ligaments contained openings of about the same size which were symmetrical and with smooth edges. The appendix was attached to the lower border of the opening on the right side and no evidence existed of previous inflammation. It is also probable that the hernia with obstruction in Barr's patient occurred through a congenital opening.

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KINEPLASTIC AMPUTATIONS, ARM-BIMOTOR AND A PROSTHESIS

By DR. GUILLERMO BOSCH ARANA, BUENOS AIRES, ARGENTINA

Professor Faculty of Medicine, Member of the Faculty of the University of Chile, Surgeon in Chief of the Plastic Hospital

THE study of the kinematization of amputation stumps has a special interest for it arouses in the mind of all surgeons the natural desire to rehabilitate the maimed by supplying the lost limb. The ideal in the problem of the mutilated is to give to the artificial limb the power to function completely—the ideal in every operation being to provide for the complete substitution of any organ, be it kidney, artery, or joint.

As far as mutilations are concerned the tendency in kineplastic methods is toward the new physiological surgery or functional surgery in which kinematized muscles move the prosthesis.¹ It is not claimed therefore that the limb should be replaced by a natural grafting process, as has been attempted in the case of joints, kidneys, etc., but that an artificial limb shall be fitted to

1. Kineplastic method

a stump supplied with muscles which have been prepared to hold the prosthesis by perforation, lined with skin. When the prosthesis is adjusted these muscles transmit movements at will.

The grafting of a natural limb to replace a mutilated one is a problem foreign to kinematization of the limbs. This latter seeks the solution of a problem correlative with the present advance in surgery and the art of prosthetics. Kinematization is an original and very reasonable branch of surgery which is closely associated with orthopedics.

In an earlier publication (1) I presented reports of cases of patients maimed in the forearm for whom I had succeeded in obtaining excellent practical results. At that time I compared kineplastic amputations of the forearm with the radiocubital pincers of Krukenberg Putti (4). In SURGERY GYNECOLOGY AND OBSTETRICS in 1923 I described a kinematic prosthesis which I believe is original with me and which provides a very satisfactory method of dealing with very short stumps of the forearm. I also described (2) a new process for the kineplastic disarticulation of the elbow, demonstrating the desirability and advantages of such disarticulations. In this article I



Fig. 1. Case 1. Double motor for forearm: 1. biceps motor; 2. triceps motor.



Fig. 2. Case 2. Showing the bimotor: biceps and triceps.

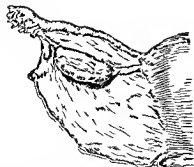


Fig 1 Adopted from Solotta McMurrich The division of the upper posterior surface of the ligament into two spaces by the utero-ovarian with the border of the ovary with the result that this surface is divided unequally into an upper triangular portion the mesosalpinx and the lower part the mesometrium which passes medially to the side of the uterus

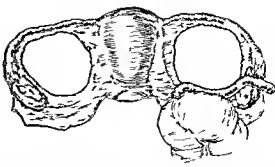


Fig 2 Each broad ligament presented a window 5 centimeters in diameter limited anteriorly by the tube and posteriorly by the attenuated utero-ovarian ligament and the ovary The proximal end of the appendix extended parallel with and was attached to the posterior edge of the window of the right broad ligament the distal end pointing to the right

bowel movement for 48 hours Digital examination was negative The temperature was 103 the pulse 78 and of good volume Heavy albumin with granular and hyaline casts was present in the urine

On the third day she was operated upon A suprapubic median incision allowed a considerable quantity of cloudy fluid to escape Inspection revealed about 12 inches of the small intestine passing through an opening in the left broad ligament and tightly constricted Traction failed to dislodge the imprisoned gut The aperture was enlarged by tearing with the finger releasing the intestine Hot saline sponges restored the circulation in the gut Considerable hemorrhage occurred as the result of rupture of the ovarian vessels where the opening in the broad ligament was enlarged Relief of pain nausea and vomiting was immediate and complete The patient made an excellent recovery

CASE 4 (Fagge's first case) Mrs Y age 61 The only history of any accident was a fall down stairs in 1902 Beyond a hematemesis in 1905 there was no history of any abdominal trouble She was the mother of five children On December 9 1917 while straining at stool she was suddenly seized with abdominal pain This pain was referred to the left iliac region She vomited several times Nothing was to be made out on abdominal examination except marked tenderness low down in the left iliac region The tongue was clean but her aspect was anxious No exact diagnosis was attempted before operation Conditions considered were torsions of an ovarian cyst strangulated obturator hernia and mesenteric thrombosis When under the anesthetic a vaginal examination detected fullness of the left vaginal fornix and a rectal examination confirmed the presence of a mass in Douglas pouch

Abdominal incision exposed small intestine and lower down and to the right a coil of ileum which was distended and purple It could not be drawn

out and was evidently held down in the pelvis This and another collapsed coil were traced down to the left side of the pelvis where they were caught and held tensely as they passed through a small hole in the peritoneum They were obviously the afferent and efferent limbs of the atretic loop which could be seen and felt under a layer of peritoneum filling up the left half of the pelvis It was thought at first that the orifice was the entrance to the inter sigmoid fossa but the peritoneum passed over the pelvic brim to the left and below its margin was continuous with a tense layer of peritoneum passing on to the side of the uterus The margin of this opening was divided by scissors allowing the distended loop of the ileum to be withdrawn when it was found that this loop had passed from behind forward into the broad ligament and filling up Douglas pouch had formed the mass which was palpable through the rectum and vagina The loop actually strangulated was 10 inches long The gut was viable The opening in the broad ligament just below and median to the ovarian ligament was closed by a continuous catgut suture A large rubber drain was passed into Douglas pouch In February 1917 the patient had another severe attack of left sided abdominal pain This recurred in March The abdomen was reopened at Guy's Hospital on March 12 1917 and extensive adhesions between the scar and the lower ileum were freed The opening to the left broad sac had remained closed

CASE 5 (Fagge's second case) Miss P age 49 was seized with abdominal pain on November 30 1917 She vomited at intervals The next morning she did not appear acutely ill but she vomited occasionally and the pain was not severe The next day she fainted On December 3 she continued to vomit occasionally and the pain located in the middle of the abdomen was severe There was now slight rigidity and tenderness over the right rectus slightly internal to McBurney's point



Fig 5

Fig 5 Another prosthesis furnished to patient
 Fig 6 Bimotor with prosthesis for flexion of elbow
 2 for rotation of the hand



Fig 6



Fig 7

Fig 7 Flexion of elbow rotation of the hand and flexion
 or extension of the finger

ample large wide tunnels an admirable condition in that it favors orthopedic results and the best adaptation of the apparatus to be inserted in the tunnel or eye of the motor. As I have stated in a previous article (3) the larger the skin tunnel the better the adaptation of the motor to its prosthesis. Or in other words the power of the motor is better applied the greater the skin surface of the tunnel which is utilized in the transmission of its energy to the prosthesis. In any one of my 3 cases the finger could be inserted easily in the skin tunnel. With up-to-date technique the operation is simple and easy and may be done by anyone familiar with the usual operative practice. Sauerbruch has adopted this method with little variation (5).

Anesthesia may be local and infiltrative. For greater ease in the operation I have used Kulenkampff's truncular anesthesia which dissociates pain from muscular movement and makes it easier for the operator to choose the site of the tunnel through the muscle by taking it at its widest expansion or free action.

The skin is incised to form a bridge 5 centimeters long and 10 centimeters wide. The skin is freed with its surface aponeurosis and formed into a tunnel by means of a suture *en cartouche*. The muscle that is to be turned into a motor is sutured at

its farther extremity near the end of the stump on the fibrous scar of the old amputation so that the muscle may be left as long as possible and at the same time that there may be no extra hemorrhage when it is sectioned. The muscle is dissected and freed upward the muscular mass is sectioned in two frontal flaps one of which passes in front of the tunnel or skin bridge and is sutured to the other muscular flap behind the tunnel which is thus closed and clasped by the muscle motor thus formed. Hemostasis is secured and the edges of skin of the wound sutured directly. External dressing is applied. The operation is effected on both arm surfaces forming one motor with the biceps and the other with the triceps. A week later the stitches are removed a fortnight later gentle mobilization is effected and a month later active exercises are instituted which are gradually intensified and are carefully controlled and regulated by a nurse or a responsible skilful masseuse.

It is well to add that it is at this stage that the operation may fail for the patient, wishing to gain time and to demonstrate his kinetic progress, indulges in too strenuous an effort and brings on ulceration of the internal wound in the skin-tunnel or else the muscular suture of the motor becomes torn. Ulceration of the tunnel heal

DEPARTMENT OF TECHNIQUE

A METHOD OF PARTIAL GASTRECTOMY WITH TELESCOPIC ANASTOMOSIS

By W. WAYNE BARCOCK, M.D., F.A.C.S., PHILADELPHIA

I AM persuaded that the ideal method of anastomosis after partial gastrectomy is an end-to-end union between the stomach and duodenum. The stomach then empties directly into the duodenum which has a mucosa and alkaline fluids particularly adapted for handling the erosive chyme. Secondary marginal ulcer is then rarely to be feared. The normal intestinal current lines are maintained. The duodenal hormone is formed under conditions that approximate the normal. There is no reason for the secondary degeneration of the pancreas mentioned by Borodenko as following a lower point of anastomosis. The main intestinal stream is not shunted from the stomach to the jejunum and therefore reflux into the eliminated duodenum with distention and possible opening of the duodenal stump or stagnation inflammation ulceration cannot occur. Oschner's muscle the sphincter of the duodenum and the barrier against overloading of the jejunum and ileum may be retained to regulate the emptying of the stomach and maintain the ileopyloric reflex. The jejunum is not disturbed and secondary symptoms from its adhesion angulation or torsion are eliminated. The mesentery of the transverse colon is not opened and herniation into the lesser peritoneal cavity is not to be feared. Large or small intestinal loops that favor obstruction or herniation are not produced. A secondary entero-entero-anastomosis is not required. A single zone of the digestive tube is subjected to suture instead of two or more zones. Finally, my personal late results from end-to-end suture have been satisfactory. Many reasons therefore confirm the belief that when it is feasible an end-to-end anastomosis is the most nearly physiological and anatomical method in partial gastrectomy.

The objections to an end-to-end union between the stomach and duodenum are

1. The disproportionate size of the openings in the stomach and duodenum producing technical difficulties especially when large resections of the stomach are necessary.

2. Excessive tension with the danger of secondary separation and leakage at the suture line.

3. Secondary narrowing of the new opening with obstruction.

4. Difficulties in mobilizing the duodenum with danger of hemorrhage leakage or damage to the pancreas the pancreatic or biliary ducts.

Difficulties in uniting the cut end of the duodenum with the stomach have been emphasized by the use of clamps and the failure of the operator to attempt that which at the onset seems almost impossible the fitting together of the edges of openings very different in size. Under peristaltic contraction however the diameter of the stomach closely approximates that of the relaxed duodenum. By making a transverse instead of an oblique section of the stomach by stretching the end of the duodenum to its greatest diameter by spacing the sutures so that they are three or four times as far apart on the gastric as on the duodenal side we have repeatedly been able to make a satisfactory end-to-end anastomosis when from one half to two-thirds of the stomach have been removed. Expedients employed largely in earlier cases before we discovered the feasibility of a pure end-to-end union included modifications of the Billroth I method in which the duodenum was implanted at the upper angle or middle of the gastric incision and the enlargement of the duodenal opening by secondary incisions through the superior or inferior wall (Fig. 3). These methods are useful to meet conditions found in individual cases. With proper mobilization of the duodenum and stomach it is rare that the openings of the stomach and duodenum cannot be apposed when not more than two thirds of the stomach have been removed.

Kocher over 20 ago years described the mobilization of the duodenum by dividing the peritoneal reflection on the right side. With the stomach mobilization depends largely on sufficient freeing the lesser curvature and William Mayo has emphasized the value of a high ligation and division of the gastric artery. Tension after the

CONCLUSION

In conclusion I may say that my patients can grasp any object of average weight lift it to the mouth or either side of the head bend the arm or extend it they can go through all the movements of pronation or supination of the hand necessary to hold objects or take articles and carry them to the mouth and raise the hand in complete abduction so as to form a right angle with the body (Fig 7)

In every one of these attitudes the fingers can take hold of an object or lay it down at will through the kineplastic arm motors. In a word we have an artificial upper limb the success of which depends entirely on the personal effort of the

patient in training and re educating himself in its use

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SUBASTRAGALOID ARTHRODESIS IN THE TREATMENT OF OLD FRACTURES OF THE CALCANEUS

By RUDOLPH S REICH M.D. CLEVELAND OHIO

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ALTHOUGH total disability very commonly follows fracture of the calcaneus the treatment of this condition has been on the whole unsatisfactory and a rather careful search of available literature does not offer much assistance in the solution of this problem.

Cotton considers this disability due to an outward broadening of the calcaneus resulting from a lateral impaction of the peroneal plate and to growth of new bone behind it. He states that the external malleolus impinges upon the exuberant bone and causes pain by pinching the peroneal tendons when in motion. Lateral motion is limited and painful. The limitation is due either to the blocking of the posterior subastragaloid joint and to the fracture across it the fracture displacing the unbroken joint surface or shortening the slide or to new bone heaped up anterior to the malleolus. He suggests as treatment removal of all spurs on the calcaneus and in more severe cases liberal excision of the impacted portion of the calcaneus beneath the external malleolus. This is followed by forcible manipulation—rotation abduction and adduction to remove all obstacles to normal motion. For cases of shortened and flattened heel with outward displacement he suggests cross sectioning the calcaneus behind the posterior portion of the subastragaloid joint and molding of the heel in a plaster-of Paris bandage.

Magnuson also considers the disability to be due to impingement of the peroneal tendon against the external malleolus and in addition to pronation of the foot and strain on the plantar fascia with loss of lateral motion. Treatment recommended by him is similar to that suggested by Cotton.

In the cases of disability following fractures of the calcaneus observed by the writer the findings do not substantiate those of Cotton or Magnuson in spite of the fact that these cases showed severe impaction and lateral displacement of the calcaneus in the region of the external malleolus with limitation of motion in the subastragaloid joint. This is the only type of fracture of the calcaneus which results in serious disability.

When one considers the anatomy and function of the ankle joint he finds the astragalus articulates with the tibia and fibula forming the tibioastragaloid joint in which dorsal and plantar flexion of the ankle joint take place. Lateral motion in the tibioastragaloid joint is almost completely limited by the position of the external and internal malleoli on each side of the astragalus. Below is found the subastragaloid joint which is formed by the astragalus and calcaneus the function of which is to provide pronation and supination of the foot joint. The inferior extremity of the internal malleolus is slightly higher

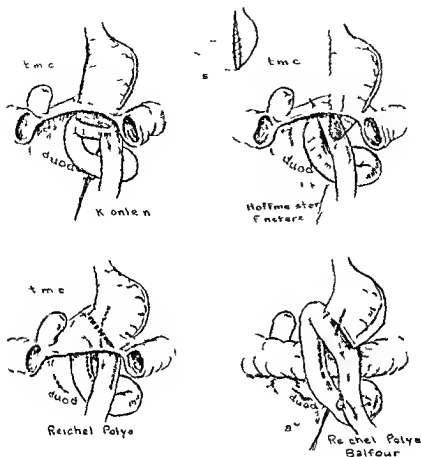


FIG. 2. More recent methods of partial gastrectomy. Kroenlein method a low section of a narrow stomach was made and the small end of the stomach united to the side of the jejunum. This has been supplanted by the more radical Reichel Polya and Hoffmeister Finsterer methods in which care is taken to have the afferent loop of jejunum higher than the efferent. Hoffmeister Finsterer method a large very oblique gastric resection with removal of part or all of lesser curvature. Large retrocolic anastomosis with edge of lower part of gastric incision united to side of jejunum. Developed for gastric ulcer by Finsterer but considered by many surgeons unnecessarily radical. Reichel Polya method an isoperistaltic retrocolic union of the end of the stomach to the side of the duodenum. Balfour's modification of the Reichel Polya operation an isoperistaltic antecolic union of the end of the stomach with the side of the colon. Used to avoid the tension and technical difficulties of the retrocolic union particularly if the residual portion of the stomach is small, high and rather fixed. To avoid reflux distention of the proximal loop an entero-enterostomy has been added. T M C—Transverse mesocolon. S—Stomach.

and burning. The fallacy of aseptic operations upon the alimentary tract with a crushing clamp will be corrected as operators note the bacteria forced through the intestinal walls in crushing.

In partial gastrectomy the late dangers and complications of an associated gastrojejunostomy should be eliminated if possible. Unless necessi-

tated by the character of disease a transverse resection so that peristaltic waves reach the end of the lesser and greater curvature simultaneously is desirable. Oblique resections with sacrifice of a disproportionate portion of the lesser curvature may as after V shaped resection of lesser curvature be followed by motor irregularity. In the

ankle is immobilized in a plaster-of-Paris cast extending from the toes to a point just below the knees maintaining a neutral position of the foot. If the fracture has extended anteriorly into the calcaneocuboid joint the outer incision is carried farther forward exposing this joint and the cartilaginous surfaces are removed. If the comminution has extended posteriorly and has resulted in exostoses on the inferior portion of the calcaneus, they obviously should be removed.

The plaster cast remains for 3 months after which the patient is permitted to bear weight in a shoe with a well fitting longitudinal arch support. In addition the patient receives a systematic course of physiotherapy treatment in order to restore the dorsal and plantar flexion of the ankle joint.

The subastragaloid arthrodesis has been performed in four cases which presented the findings as previously described. The first case was operated upon in April 1924—the last in May 1925. Sufficient time has not elapsed for final judgment to be passed on this procedure. However the writer has had such gratifying results that he does not hesitate to recommend this form of treatment for the alleviation of this serious disability.

Although it is not within the scope of this paper to consider the treatment of recent fractures nevertheless the writer strongly urges the employment of the subastragaloid arthrodesis in those impacted fractures of the calcaneus in which the roentgenogram shows involvement of the subastragaloid joint. This should be done in addition to the treatment for recent fractures as

prescribed by Cotton and Funsten. It is more than probable that such a procedure would have to be carried out at some future time, whereas if it were done shortly after the occurrence of the fracture it would result in a great economical saving particularly in industrial patients.

CONCLUSION

Disabilities resulting from impacted fractures of the calcaneus are due almost invariably to a comminution extending into the subastragaloid joint which results in a traumatic osteo-arthritis. Consequently there is severe pain on pronation and supination of the foot. The invasion of the fracture into the calcaneocuboid joint and into the plantar surface of the calcaneus causes exostoses which contribute to the disability. The treatment therefore consists in arthrodesis of the subastragaloid joint. If the calcaneocuboid joint is involved this also should be arthrodesed. If spurs are present on the plantar surface the should be removed. Subastragaloid arthrodesis has been performed on four cases and the results have been so satisfactory that the writer urges this treatment for this type of case.

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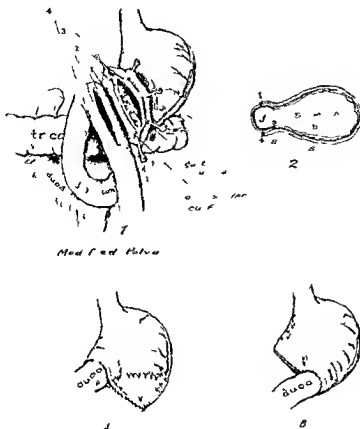


Fig 4 Telescopic anastomosis showing adaptations of the method that may be used in end-to-side, side-to-side, and end-to-end anastomoses of the stomach and bowel. 2 165a type of gastrectomy with telescopic union. The gastric mucosa is resected to a higher level and the redundant seromuscular cuff has its inner denuded surface applied to the serous coat of the jejunum around the stomach. 2 Anastomosis shown in cross section. The edge of the jejunal opening is united to the gastric mucosa at 2 and 3. The denuded seromuscular cuff of the stomach is shown partially surrounding and attached to the outer wall of the duodenum at 1 and 4. A Modification of telescopic anastomosis after partial gastrectomy with reduction in the functional capacity of the stomach by extensive resection of the gastric mucous membrane. The gastric mucosa has been removed from within the dotted lines; the duodenum invaginated into the upper angle, united to the mucous membrane of the stomach; the mucous closure completed to the greater curvature and the redundant seromuscular coats of the stomach apposed by internal or by mattress sutures. B Similar telescopic implantation of the duodenum at the lower angle of the incision.

between the edges of the abdominal incision to prevent postoperative hernia. The duodenum is thin and easily torn and approximates in thickness the mucous layer of the stomach. The smallest circumference of the stomach, the inner is applied to the largest circumference of the duodenum, the outer. The telescopic union

therefore has the advantage of strength reinforcement and mechanical adaptation. The depth of invagination is from 2 to 6 centimeters and varies with the available length of the duodenal stump and the amount of stomach resected.

Technique. Through a convenient incision the abdomen is explored, the lesions determined and

TECHNIQUE FOR THE ROENTGEN DIAGNOSIS OF FRACTURES OF THE CLAVICLE

By FORTUNATO QUEVEDO M.D. LIMA PERU
Fellow of the American Orthopedic Society of Lima

WHEN one follows the method ordinarily employed in the roentgen diagnosis of fracture of the clavicle which consists either in making one roentgenogram in the frontal direction centering the rays over the midpoint of the clavicle or in exposing two films according to the stereoscopic technique there are several important errors which may be committed.

In order to bear out this statement let us review three cases selected at random in which we have been able to make a comparison of the X-ray data with our operative findings.

In the first case (Fig 1) stereoroentgenograms were made which in the stereoscope seem to show that superimposed upon the overriding fragments (a and b) there are two little shadows (c and d) which were interpreted as two small splinters. The roentgen diagnosis was: Fracture of the clavicle with two principal fragments and two insignificant comminuted fragments. When we operated on this patient we found the bone broken into five pieces three of which we had not suspected either as to their size or their disposition (one of them 3 centimeters long by 1.2 centimeters wide we are preserving). We find ourselves very much dissatisfied with this diagnostic result.

The second case (Fig 2) which we examined having fresh in mind the experience gained in the preceding case was quite similar. The single roentgenogram showed nothing more wrong than

the wedge shaped overriding ends of the two fragments (a and b) of the broken clavicle. At operation on this patient we again found the bone broken into five large fragments and three small ones. This was another roentgenographic error.

In the third case (Fig 3) the film seemed to show a fracture of the clavicle without displacement—a green stick fracture. This impression proved even more incorrect for simple inspection of the clavicular region and palpation of the part showed frank overriding of the fragments. At open operation, when we raised the flap we habitually employ in these cases we could see that the superposition of the fragments was very marked, as is shown in the accompanying photograph of the operative field (Fig 4). Once again we realized into how great an error we might be led by the classical roentgenographic technique.

How then in a case of clavicular fracture were we to determine exactly the number of the fragments the direction of the line of fracture the degree of overriding the distribution of the comminuted bone, etc? In dealing with fractures of other long bones (humerus or tibia for example) the details are perfectly well shown by films made at right angles for a phase not suspected in the anteroposterior film may be demonstrated easily in the lateral position or vice versa. If we desired to apply this principle to the study of the clavicle we would have to make one anteroposterior film



Fig 1 Superimposed upon the overriding fragments (a and b) there are two little shadows which were interpreted as two splinters.

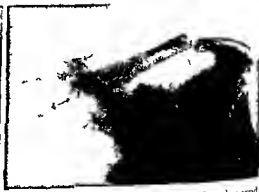


Fig 2 Roentgenogram shows the wedge-shaped overriding ends of the two fragments (a and b) of the broken clavicle.

meters distal to the proposed line of duodenal division stretched across and united to the posterior musculo-serous edge of the open stump of the stomach by means of guide and continuous sutures (Fig 10). Before introducing the continuous suture the relative breadth of the stomach and duodenum at the suture line is noted. If the former is three times as wide as the latter, it is obvious that the bights of the continuous suture should be spaced three times as far apart on the gastric as on the duodenal side. This rule is to be observed throughout the anastomosis. The introduction of several preliminary spacing sutures is helpful. The lower section of the stomach is now removed by dividing the duodenum along line three. Absolute hæmorrhage on the duodenal side having been obtained the remaining soft clamp on the stomach is gradually opened and bleeding vessels ligated when the clamp may be removed or reapplied at a higher level. The next step is to turn the free end of the duodenum into the open end of the stomach and unite it to the edge of the gastric mucosa. In this step also guide and spacing sutures will aid in the proper introduction of the continuous suture. These sutures pass through the entire thickness of the duodenum and the mucosa of the stomach (Figs 11, 12, 13). An intermediate row of interrupted sutures to unite the outer surface of the duodenum and the inner surface of the exposed muscularis

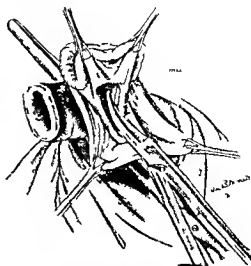


Fig 8. Telescopic gastrectomy continued. The separated cuff of gastric mucous membrane is divided on the line formed by the proximal clamp.

of the stomach is usually desirable to obliterate the dead space and control oozing. The anterior edge of the mucosa of the stomach is now united to the anterior edge of wall of the duodenum finishing this continuous suture after which the intermediate interrupted and external continuous suture lines are completed on the anterior face of the anastomosis (Fig 14). The operation telescopes a section of the duodenum 2-4 or more centimeters long within a section of stomach denuded of its mucous membrane. The entire thickness of the duodenal edge is united edge to edge with the gastric mucosa and surrounded by the thick musculo-serous coat of the stomach. Thus the duodenum which often is thin rather friable and easily lacerated by sutures has a wide reinforcement by the thicker and tougher gastric wall. We have used No 00 or No 0 chromic catgut for all sutures. Obviously from the elasticity of the tissues the cuff of mucous membrane resected from the stomach may be much longer than the invaginated portion of duodenum. If desired the shape of the sero-muscular cuff may be modified as by making a long posterior and a short anterior flap. Properly performed the telescopic anastomosis produces a union with little wrinkling or external evidence of redundancy. The larger gastric end fits about the duodenum in a surprising smooth and accurate way (Fig 15). Viewed from the inside of the stomach on the cadaver (Fig 16) the normally

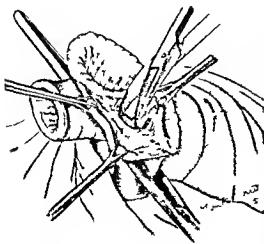


Fig 7. The gastric mucous membrane is being separated from the muscular coat by curved Mayo scissors.

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F. Lepor 1 Cl. 1 Orthopedic S. g. 77 Ls. 25 of Lm

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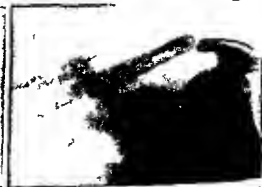


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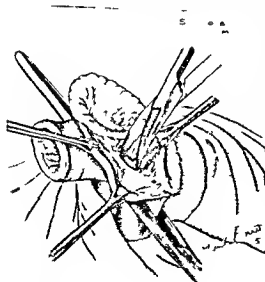


Fig 7 The gastric mucous membrane is being separated from the muscular coat by curved Mayo scissors

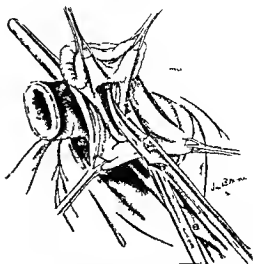


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Fig 7 Film secured by old fashioned method



Fig 8 Film secured by new method.

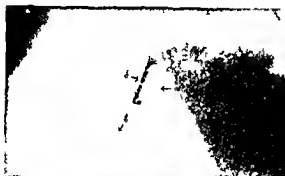


Fig 9 Roentgenogram from below upward



Fig 10 Uninjured shoulder from above downward



Fig 11 Uninjured shoulder from below upward



Fig 12 Roentgenogram made by old method

little bit toward the thorax and in the contrary direction in making the second one.

In the first case in which we tried this technique we worked with my friend the roentgenologist Dr. Fladio Lanatta the ninth of October 1924. We selected a patient who carried in his right clavicle a Dujarier clamp which served admirably

as a means of checking whether we had really succeeded in getting the two positions properly at right angles. It was also necessary to compare the results with those obtained by the ordinary technique. A preliminary roentgenographic study by the usual old fashioned method gave us a film (Fig. 7) showing what seemed to be a satisfactory

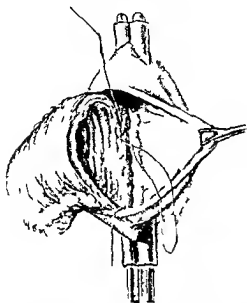


Fig. 11. Union of the edge of the duodenum to the edge of the mucosa of stomach by continuous suture. First row of sutures interrupted. Guide and pacing tube not shown.

The operation was in a distant city and the wound was closed with a small gauze wick and with insufficient search for an oozing point. Then my bad advice prevented the local surgeon from reopening after I had left until the patient was in extremis.

With low acid values or offensive gastric contents we administer dilute hydrochloric acid before the operation and inject a 0.5 per cent solution through a hypodermic needle into the stomach and duodenum before opening the viscus. This we believe reduces the chance of infection.

CASE 1. Duodenal ulcer with subacute perforation to pancreas. Gall stones in appendix. Telescopic partial gastrectomy, appendectomy. Recovery.

Mr. D. M. L. referred by Dr. J. M. Cunningham, age 35. Patient was anemic and had had gastric symptoms for 10 years with marked increase in symptoms for the past 3 months.

Operation. May 27, 1924. Spinal anesthesia was used—6 cc. mignars of alcoholized stovain through the twelfth dorsal interspace reinforced by 200 cubic centimeters of 1 per cent adrenalinized procaine injected locally. A duodenal ulcer with subacute perforation and dense adhesions to pancreas was found on the posterior wall of the second portion of the duodenum. The pylorus was almost occluded. There were faceted gall stones in the appendix one centimeter in diameter and about 3 millimeters in diameter. A partial gastrectomy with telescopic resection was carried out with three rows of No. 0 and No. 00 chromic catgut sutures. The operative difficulties were

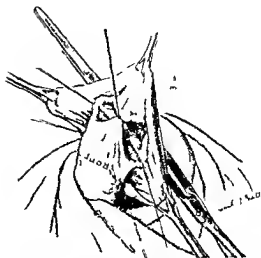


Fig. 12. Edge of duodenum partially united to edge of mucosa of stomach. Interrupted guide and spacing sutures shown.

greatly increased by the adhesions to the pancreas. The appendix was removed. The patient's recovery was uninterrupted and December 1925 he reported that he was eating everything and free from gastric symptoms. At this time he was thin and showed evidence of pulmonary tuberculosis.

CASE 2. Gastric ulcer of lesser curvature with subacute perforation. Telescopic gastrectomy under local anesthesia. Recovery.

Dr. D. J. C. referred by Dr. Louis Brinton, age 48. Patient a previous alcoholic had suffered from digestive disturbance for 3 years.

Operation. June 19, 1924 under local anesthesia with 600 mls. of 1 percent adrenalinized procaine. A Perthes incision was made. A gastric ulcer with a crater measuring 2 by 1 centimeters was found on the lesser curvature of the stomach near the pylorus that had penetrated the muscular coat and was covered by adherent omentum. The first part of the duodenum and about one fourth of the stomach were removed, the duodenum being first divided. A modified telescopic union with a long posterior and short anterior flap was used with continuous and interrupted sutures of fine chromic catgut. The tissues were very vascular and friable. A hematoma requiring drainage developed in the abdominal wound and a postoperative cough was followed by an incisional hernia. The gastric symptoms have been relieved by the operation (January 1926).

CASE 3. Multiple gastric ulcers diffuse gastritis. Partial gastrectomy, appendectomy. Relief for one year only.

Mr. Davis, age 35, referred by Dr. Wm. L. Robertson fell from a box car November 1923 striking the sternum. Soreness over lower sternum followed, succeeded by burning in the epigastrium and in February 1924 by nervousness and inability to work. The tonsils and adenoids were removed in March 1924. Gastric symptoms with much sour belching and pain beginning 1 hour after meal and radiating from the epigastrium to the back increased and the patient finally could eat only ice cream with comfort and

more. The stereoroentgenograms showed us (Fig. 13) the same fragments (*a* and *b*) and surprised us by showing that the external branch (*c*) of the fork was split off.

None of these roentgenological data explained the outstanding clinical fact which in this case necessitated operation: one could feel a very sharp bony fragment which threatened to perforate the skin in this region.

The two roentgenograms made at right angles by our technique gave us a more complete and logical result. In the first film exposed from above downward (tube position *A* Fig. 6) we found (Fig. 14) a beveled internal fragment (*a*) markedly overriding the external fragment (*b*) which was also beveled but in addition a third loose fragment (*c*) long placed vertically with its outer border (*e*) straight and its inner border (*f*) convex with very sharp-pointed ends (*c* and *d*) the upper point threatening to pierce the skin. The loose fragment was about 5 centimeters long by 1 centimeter wide. In the film exposed from below upward (tube position *B* of Fig. 6) we found (Fig. 15) the same fragments (*a* and *b*) overriding in the anteroposterior direction with their beveled ends somewhat obtuse and superimposed upon

them a very dense shadow (*c*) which was no other than that of the third fragment seen in its short diameter, thus permitting us to appreciate its thickness and its location anterior to the principal seat of fracture. We were now able to make a complete roentgen diagnosis—one agreeing with the clinical observations. At operation when we lifted the flap of soft parts there was presented to our vision and to that of visiting surgeons (among them the Dean of the Faculty of Medicine Dr. Guillermo Gastafeta) a panorama of the zone of fracture exactly corresponding to the roentgenographic image of Figure 14: the two beveled fragments and the third fragment placed in front directed vertically toward the lun and of the dimensions which we had calculated from the roentgenogram.

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ANASTOMOSIS OF VEINS

A METHOD WITHOUT THE USE OF SPECIAL INSTRUMENTS

By CLARENCE F. BIRD, M.D., NEW HAVEN, CONNECTICUT
Fifth Department of Surgery, Yale University School of Medicine

THE method described for anastomosing veins was developed to provide a large reversed Eck fistula in dogs a stage in the procedure for the removal of the liver for experimental purposes as outlined by Mann (5). It may however prove of use in human surgery.

A large opening the caliber of the portal vein or larger is essential for consistent success with the reversed Eck fistula. On first attempting the operation we used the method described by Bernheim, Homans and Voegtlin (1) which involved blind cutting with scissors. This method is satisfactory only for small fistulae and all our animals died within 18 hours.

Similar procedures such as using a cutting thread (3) or a fine cautery wire (6) instead of scissors were not attempted. The operation of Jeger (4) in which he uses special clamps to isolate a portion of each vein wall without inter-

rupting the blood stream appears to have much merit. It has however the disadvantage of requiring special instruments and it cannot be used on small veins. An operation was therefore devised by which with no special instrumentation a large opening could be consistently obtained.

OPERATION

A healthy animal kept without food for 12 to 24 hours it being desirable to have the stomach empty and the portal vein unengorged. An incision is made in the midline from the xiphoid process 25 centimeters toward the pubis in a dog of average size. In males the penis is undercut it being inadvisable to leave the midline because many large veins important in establishing compensatory venous return after operation would be cut. Two moist wadding off towels are now introduced deep into the abdomen. A self retaining



Fig. 15. Completion of sutures uniting outer layer of stomach and duodenum.

being increased by food and without vomiting. The X-ray showed a large 6-hour gastric residue and deformity of the duodenal cap. The patient is pale, rather emaciated, and has a coagulation time of 6.5 minutes. A blood transfusion was given October 9, 1924.

Operation October 31, 1924. A vertical 14-centimeter upper right rectus incision was used. Spinal anesthesia by 6 centigrams of alcoholized stovaine in the twelfth dorsal interspace reinforced by local anesthesia with procaine and one third of a grain of morphine and a very small quantity of ether given to dull consciousness. The duration of the operation was 180 minutes. A recurrent duodenal ulcer with a crater a centimeter broad penetrating to the serosa was found in the posterior wall of the duodenum near the pylorus. The gall bladder was adherent at the site of previous cholecystogastrostomy, but the stomach had healed. Adhesions were separated and the upper part of the duodenum and the lower one half of the stomach were excised and a telescopic union made with two rows of continuous interrupted sutures of No. 00 chromic catgut. An appendectomy was also done. The patient was discharged 19 days after operation and has had complete relief from all gastric symptoms up to last report made in January 1926.

CASE 6. Ulcerating carcinoma of the stomach. Gastrectomy. Recurrence.

Thomas F. Muer, age 44, referred by Dr. W. P. Hall. The patient and three brothers had pulmonary tuberculosis and the patient has had frequent rheumatic attacks. In October 1923, he developed pain one half to one hour after meal with weakness and loss of flesh but without nausea or vomiting. The attack lasted 6 weeks and recurred in May 1924, since which time it has been continuous. He has lost 25 pounds in the past year. There is increased resistance in the epigastrium.

Operation November 19, 1924. Spinal anesthesia by stovaine and local anesthesia with procaine reinforced by 1 unit of 1% morphine and 1/100 grain of scopolamine. Through a 14-centimeter upper right rectus incision, an ulcerating carcinoma involving the anterior wall and great curvature of the stomach near the pylorus was found. The ulcer base dirty and sloughing measured 2.5 by 4 centimeters; the ulcer edges were thick indurated and irregular and nodules were found along the greater curvature of the stomach and enlarged lymph nodes along the greater and lesser curves.

Two thirds of the stomach and the first part of duodenum were removed with telescopic anastomosis by three rows

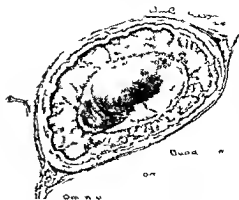


Fig. 16. Union viewed from within stomach after operation on cadaver. The large open funnel-shaped stomach is shown.

of sutures. The patient was discharged 14 days after operation and on January 19, 1925, he had continued free from symptoms and had gained 35 pounds. In September 1925, the patient died from metastasis of the cancer.

CASE 7. Duodenal ulcer with partial pyloric obstruction. Partial telescopic gastrectomy and appendectomy. Recovery.

Mr. Joseph L. referred by Dr. Arthur McGinnis, age 47, toolmaker, had typhoid at 30 years followed by dyspepsia with gaseous eructations, colic and constipation. When 45 years old, he had a gastric attack with pain under lower sternum, relieved by food. Four months later the condition recurred and since then attacks have recurred at decreasing intervals. The pain has been constant for the past 3 weeks and is not relieved by food, although to some degree by soda. There has been no vomiting or passage of blood. Citrus fruits especially disagree. The patient has lived on liquids for 4 weeks and has lost 7 pounds. The gastric analysis shows much mucus and undigested food and the duodenal cap does not fill under the fluoroscope.

Operation January 2, 1925. A vertical upper right rectus incision was made. There was an ulcer on the anterior face of the duodenum just distal to the pylorus with pyloric narrowing. Adhesions were separated, the upper duodenum and lower end of stomach freed, and lower third of stomach and first portion of duodenum excised. The cuff of gastric mucosa was readily separated and removed. Four centimeters of duodenum were telescoped into the stomach with an outer serous and inner mucous row of continuous fine chromic catgut and an intermediate row of interrupted fine catgut sutures. The appendix had a thickened mucosa and contained fecal masses and was removed. The duration of the operation was 130 minutes. The initial blood pressure of 138-80 rose during the operation to 160-80. There was no wound complication and except for an attack of nausea and vomiting on the eleventh day the postoperative course was uneventful. At last report, January 1926, the patient had remained free from gastric symptoms.

CASE 8. Marginal ulcer with hemorrhage following gastrojejunostomy for duodenal ulcer. Anastomosis disconnected, ulcer excised, openings in stomach and jejunum

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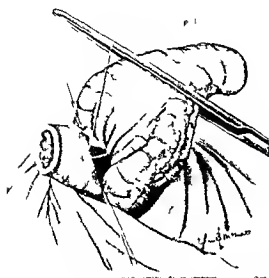


Fig. 18 Variation in technique with primary division of duodenum. Cuides for the continuous sero-serous suture being introduced.

ulcer. The upper duodenum was freed from the adhesions and the lower fourth of the stomach and first part of the duodenum excised and the duodenum telescoped for a distance of about 3 centimeters into the stomach with an outer and inner row of continuous fine chromic catgut and an intermediate row of interrupted catgut sutures. The cuff of gastric mucosa was easily separated and excised. The wound was closed without drainage. The duration of the operation was 140 minutes. The blood pressure 150-82 before the operation soon fell to 122-60 from the spinal

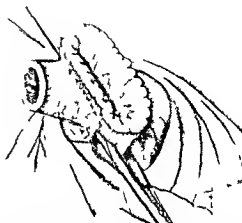


Fig. 19 Stomach divided after primary division of duodenum and sero-serous suture preparatory to removal of cuff of mucosa. This variation in technique was used in a number of the cases but it was found difficult to remove the cuff of mucosa without damage to the line of sero-serous suture.

anesthesia and then progressively rose as about 200 mls of 1 per cent procaine with 18 drops of adrenalin were given by local injection. At the completion of the operation the blood pressure was 206-100. The pulse 112 at the completion of the operation gradually increased in rate and in 48 hours the patient was restless and semi-delirious the temperature 103.2 degrees F the pulse 140 and it was realized that he was in a thyrotoxic crisis. Under refrigeration the symptoms rapidly cleared and the patient was discharged in April 1925. There was no wound complication and thus far (January 1926) the patient has had complete relief from gastric symptoms. Recurrence of thyrotoxic symptoms followed by thyroidectomy in January 1926.

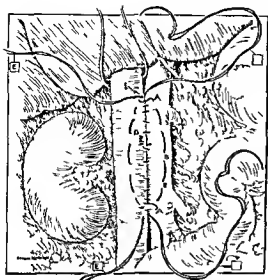


Fig. 3

In Figure 7 the hæmostatic stitch has been care fully withdrawn completing the anastomosis. The veins are now taken in the fingers and gently manipulated to make sure of thoroughly opening the fistula. Traction on the ligature around the vena cava before tying it causes slight engorgement of the portal vein and vena cava and a tachy-

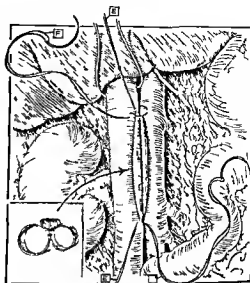


Fig. 4

cardia of 10 to 160 beats per minute. The vena cava is tied off and the abdominal wall sewed up in layers. Many abdominal veins which did not bleed on entering the abdomen are now seen to ooze and there is marked engorgement. The larger bleeders are tied but interference with the venous return is avoided as far as possible. The

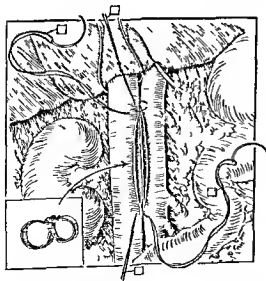


Fig. 5

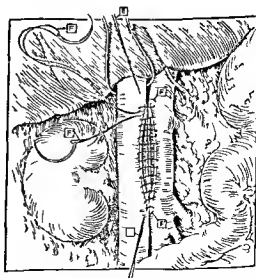


Fig. 6



Fig 3 Case 3 Biceps motor During the pose the patient worked his motor

present 3 cases in which patients maimed in the arm were later provided with prostheses for two-motor stumps (bimotor) which were made from the biceps and triceps. These patients are at present going about their usual businesses.

Hence kineplastic amputation of the upper limbs maintains the great interest the subject inspired from the beginning and all my enthusiasm is at present directed toward securing by means of kineplastic motors an artificial hand lively and mobile similar to the natural one.

A stump with two motors, a bimotor, answers the purpose best as the muscular activities of both motors are controlled and exercised antagonistically when one motor bends or contracts the other lengthens or expands as in the normal hand. This is shown in the 3 patients for whom arm stumps with two motors were provided: one motor is controlled by the biceps and the other by the triceps, the former motor situated on the front surface of the arm and the latter on the back surface, the first flexor and the second extensor, each antagonistic to the other in action but in permanent tension or mutual action when they are mounted on their corresponding prostheses (Figs 1, 2 and 3).

A kineplastic stump with a single motor, a unimotor, is consequently inferior in efficiency and result to a bimotor stump, since the antagonistic motor must be replaced by a spring and the substitute is incomparably inferior in action to a

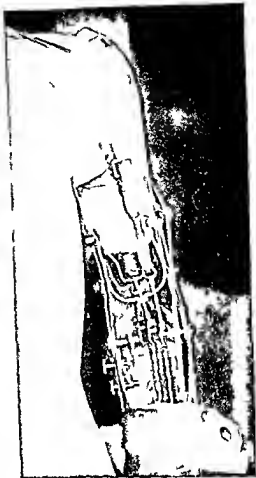


Fig 4 Prosthesis Sauerbruch form fitted to patient

muscle with its varied and multiple manifestations of power, the latter being voluntary and active while the former is purely and simply passive, mechanical, static, immutable and permanent.

An amputation stump which can be provided with two motors affords us therefore two forces of great potentiality. This is particularly true when amputation has been done in the lower two-thirds, as it places at the orthopedist's disposal the entire biceps and triceps muscles.

The technique which I use includes the making of a skin bridge or Pellegrini. More satisfactory results are found when this operation is carried out on the upper arm than on the forearm, for the skin of the upper arm is looser and more elastic because the subcutaneous cellular tissue is yielding and supple. This facilitates the formation of



Figs. 11 and 12

7. There is no loss of blood and no shock.

We have done eight of these operations on dogs varying in size from 9 to 20 kilos. Five were successful and examination at a subsequent operation showed functioning fistulae in each case. Three dogs died because the edges of the fistula were not entirely separated 2 within 18 hours and 1 after a period of 5 days. These fatalities were due to the fact that the veins were not manipulated after withdrawing the hemostatic stitch. This is apparently a very important point and the manipulation should never be neglected. In the two dogs which died soon after operation the edges of the opening were close together and cov-

ered by a fine fresh thrombus along the entire extent of the vena cava side of the anastomosis. In the dog which died after 5 days only a portion of the anastomosis had opened and this had gradually filled up by a thrombus propagated from the part which had never functioned.

Figure 8 shows a specimen removed 18 hours after operation. The veins were opened, the anastomosis filled with gauze and the specimen fixed in formalin for 24 hours before photographing.

Figure 9 shows healing in a specimen from a dog sacrificed one week after operation.

That the procedure may prove of use in human surgery is indicated by the fact that we were able to carry out the anastomosis of the inferior vena cava with the superior mesenteric vein in a cadaver. Figure 10 is a drawing showing the completed anastomosis and the important anatomical relations. Figures 11 and 12 are photographs of the cadaver specimen showing the anastomosis from the outer side and from inside the vena cava. Anastomosis of the vena cava with the portal vein in the human being immediately comes to mind.

SUMMARY

A method is described for anastomosing veins. No special instruments are necessary and the procedure may be carried out rapidly under direct vision with assurance of a successful outcome. A large oval opening is provided.

I am indebted to Dr. Carlos M. Echandi, Yale School of Medicine, for assistance with the operating.

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slowly, and leaves a retractile nodular tissue which does not bear pressure as normal skin does. The latter develops callus with exercise the former produces cicatricial tissue which constantly becomes ulcerated.

The motive efficiency of kinematized arms is marvelous re-education being easy and inspiring easy because the flexion or extension of the forearm on the opposite side recalls at once the contraction of the biceps and triceps now kinematized and inspiring because it gives the impression of a resurrection of dead muscles—muscles which have been condemned as hopeless by all surgeons who have written on the technique of maiming operations of the arms from Celsus down to our modern and contemporary surgeons. In carrying out these kineplastic operations on the arm two very potent muscles are vitalized so that the orthopedist is provided with a biceps with power intact and a triceps no less potent.

The result of the operation is all that could possibly be desired for the motors are perfect faultless. Their motor power is entirely active and the potency which you may permanently observe in these patients is the best proof I could offer you.

In one patient the construction of the motors was done in two operations. At the first operation the biceps motor was constructed 2 months later the triceps motor. In the two other patients kinematization was effected in one operation.

The two-stage operation at intervals of 1 or 2 months makes it possible to secure more skin for the tunnels as the skin yields to the traction of the first operation. Kinematization is carried out with ease in a single session when the stump affords plenty of skin. The former process will ever afford greater guarantee of ultimate success.

The motors being prepared they must be used for the active movements of the prosthesis and thereafter the study of the kineprosthesis of the arms must be begun. The subject is a vast one and I shall endeavor to avoid analyzing it in a wearisome fashion in this brief article. Therefore suffice it to state here that a good prosthesis should afford flexion and extension movements of the forearm (elbow joint) and furthermore flexion and extension movements of the fingers (finger joints) followed by supination and pronation of the forearm (hand) and flexion and extension of the wrist (carpus). These four movements are correlative and complementary and their order of importance or categorical diminution would be: first flexion of the fingers

second flexion of the forearm on the arm third pronation of the hand and fourth flexion of the wrist (carpus). It is well to note that with them are made practically the most useful movements of the principal articulations: elbow, fingers, wrist and ulna.

Many and various models of prostheses have been constructed but the one which at present enjoys the greatest favor is the one based on Sauerbruch's studies (5). The two kineplastic motors—biceps and triceps—are utilized in Sauerbruch's prosthesis for the daintiest and most delicate movements: the opening and closing of the artificial fingers that is the grasping of objects. Flexion of the forearm is performed by means of straps and a shoulder piece attached to the shoulder while pronation and supination of the hand are controlled and executed by means of the contraction of the trapezius muscle of the shoulder. Flexion or extension of the carpus is absent in Sauerbruch's prosthesis but might well be effected by adding a simple mechanical appliance and be produced by bending the spinal column toward the side.

Sauerbruch's arm may be adjusted to any position to facilitate prolonged or continuous effort by means of a system of closure with mechanical tops which the patient puts on at will and thus he may freely hold an object between his fingers without tiring the motors contracting the opposite shoulder or the trapezius muscle which controls the working of the prosthesis.

Therefore it is evident that even if Sauerbruch's prosthesis is not absolutely ideal for it does not permit flexion of the carpus nevertheless it is a prosthesis which has great and practical advantages as the arm may be used freely for the necessary acts in the course of daily life and for compensating satisfactorily for the loss of the entire upper limb.

Before concluding I wish to state that three factors enter into the success of kineplastic amputations: (1) the surgical factor (2) the orthopedic factor (3) the factor of the individual or the patient. The first it may be unhesitatingly affirmed is well under control because the technique now used by surgeon is thoroughly efficient. The second at the hands of orthopedic engineers has been solved relatively but very satisfactory as is shown by the Sauerbruch apparatuses. Lastly the third factor is the one which is the key to complete success depending as it does on the power of intellect of the will of the patient and on his ability to concentrate on his own re-education.

at that time to transplant ovarian tissue in the abdominal wall this patient had undergone that treatment. But as in other cases the beneficial effects of the grafting had failed to materialize in fact I never have seen a castrated patient suffer so much as this one did by the complications of the menopause which had resulted.

This patient required a laparotomy for lesions having no connections whatsoever with the previous operation. I therefore grasped this unexpected opportunity to examine the grafted ovarian tissue and without complicating the operation I excised the grafted ovary. This was an easy matter as we had the records of the operation done in 1920. The grafted ovary was found in its bed between the peritoneum and the posterior aspect of the rectus half way between the umbilicus and the pubis. By an incision extending beyond the limits of the entire organ the ovary and all the surrounding tissues were taken out including the smooth surface of the parietal peritoneum at the back and as far as the muscular fibers of the rectus in front. During this rapid intervention we were able to note that the organ had decreased by about half its volume within the 5 years. After incision the grafted tissue appeared enveloped in fibrous tissue. On cutting the tissues we noted a vascularization extending as far as the arterial flow. The anatomical integrity of the transplanted organ was thus conclusively established. But we were not satisfied with these proofs and so we submitted the organ for histological examination to professors Hingston and Jutras. They reported that the sections showed ovarian tissue that there was a thick layer of large clear cells such as are found normally in true stratum granulosum that these cells rested on a fibrous theca that the stroma appeared normal that vascularization was good and that there were no signs of inflammation or degeneration.

It is thus evident macroscopically and microscopically that the grafted ovary in the abdominal

wall had secured good nutrition a relative autonomy and an anatomical integrity practically perfect in view of all the conditions required for a successful grafting operation.

I see no reason why similar results should not prevail in most of the cases in my series as the operations were done with scrupulous care according to the same technique in all cases.

How is it then that in this particular patient ovarian insufficiency persisted so stubbornly as it has in most of the other patients operated upon by me for ovarian grafting?

In my opinion the answer is simple: ovarian grafting performed under present known conditions does not insure physiological integrity of the organ. On the other hand it lives as a parasite carelessly and unconcerned as to its own internal secretion. All of this likely is because the nervous system which has a function to fulfill is not able to do so. Perhaps other physiological conditions of which we are still ignorant are lacking. At least this case is an example which teaches us the fate of grafted ovaries and it reveals as well very clearly the therapeutic inefficiency of ovarian grafting.

One must have the courage to confess experimental failures. It would be too good to be true if by a simple surgical process the artificial menopausal troubles could be mastered.

From our experience I believe we are justified in saying that ovarian grafting is not more beneficial than testicle grafting from monkey to man and having thus dealt so discouragingly with the subject of ovarian grafting let us try to seek anew with the co-operation of physiologists and chemists an efficient therapeutic measure to replace our present method.

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than the subastragaloid joint whereas the tip of the external malleolus is slightly lower than the outer portion of that joint. Eversion and inversion of the ankle joint are performed in the mediotalar joint which is composed of the articulations of the astragalus and the scaphoid on the medial side and the calcaneus and the cuboid on the lateral side.

The cases seen by the writer have had but little limitation of motion and very slight pain on dorsal and plantar flexion except when the latter movement is carried to the extreme. Pain was then referred to the posterior portion of the subastragaloid joint. Lateral motion in the subastragaloid joint ranged from complete limitation in pronation and supination to approximately 25 per cent range of motion accompanied by severe pain on weight bearing. In fact these patients complained of as much limitation of motion in active and passive supination of the subastragaloid joint as in pronation. In other words in spite of the fact that there was an outward impaction of the fractured calcaneus there was but little limitation in dorsal and plantar flexion and supination was as painful and limited as pronation. A careful study of the roentgenograms in these cases reveals almost without exception fracture of the calcaneus into the subastragaloid joint and in addition often fracture of the inferior portion of the astragalus with it.

In rare cases there is also a fracture into the calcaneocuboid joint which obviously causes limitation in inversion and eversion of the tarsus and pain. Not infrequently the impaction extends posteriorly into the plantar surface of the calcaneus resulting in the formation of exostoses which are obviously very painful on bearing weight.

The author's deduction is therefore that the disability in these cases is not due as a rule to any impingement of the external malleolus and the peroneal tendons against the impacted portion of the calcaneus but is due almost invariably to a traumatic osteo-arthritis in the subastragaloid joint. The presence of spurs contributes to the disability.

The usual history given by patients afflicted with this condition is that they are able to get about with comparatively little disability when they walk on a perfectly smooth surface but when they walk on uneven surfaces they suffer severe pain in the ankle joint and fully as much in supination as in pronation.

As an illustration one of the writer's patients suffered a severely comminuted fracture of both calcanei extending into the subastragaloid joints

with the lateral impaction of the calcanei as described by Cotton and Magnuson. This patient had the usual severe disability in both ankles on weight bearing. He was fairly comfortable when walking on a smooth surface but suffered severe pain when walking on uneven ground. The roentgenograms showed that the left heel was more comminuted than the right. In due time there was almost complete limitation of motion in the subastragaloid joint of the left ankle. Coincidentally the pain and disability were almost completely overcome in the left ankle whereas the pain in the right ankle persisted. Accidentally he tripped on a rough surface broke up the fibrous adhesions that had formed in the subastragaloid joint and the pain in the left ankle returned.

In view of these findings therefore the treatment obviously should be directed to immobilizing completely the subastragaloid joint and thereby arresting the traumatic osteo-arthritis present instead of breaking up these adhesions as recommended by Cotton and Magnuson.

In order to accomplish this immobilization arthrodesis is the procedure to be recommended. By this means one can limit pronation and supination of the foot. This operation was recommended by Davis and Ryerson and others for the relief of extreme paralytic valgus and varus deformities of the ankle.

The technique of this procedure is as follows: after a well fitting tourniquet has been applied to the limb a horizontal incision is made along the medial surface of the ankle joint beginning immediately posterior to the internal malleolus and extending around the tip anteriorly and slightly upward to the scaphoid bone. Care must be taken not to injure the tendon of the tibialis posterior muscle. Dissection is carried on through the soft tissues and the subastragaloid joint is exposed. By the aid of a chisel the cartilage of the posterior articulation of the calcaneus and the astragalus is carefully removed. In order that a complete arthrodesis be obtained another incision is made on the outer side of the ankle joint extending from a point immediately posterior to the tip of the external malleolus then under the tip and slightly upward to a point immediately superior to the cuboid bone at its articulation with the calcaneus. As on the inner side the dissection is carried on through to the periosteum care being taken not to injure the peroneal tendons. The subastragaloid joint will be found slightly superior to the tip of the external malleolus and the remainder of the cartilaginous surfaces of the joint is removed. After the usual closure the

To be able by analysis of the cardiovascular history and the immediate signs and symptoms to determine the nature of the intra abdominal insult does not end the problem as far as the surgeon is concerned. In at least one case studied after the abdomen was opened the surgeon was able to decide after watching the circulation for a short time that the badly discolored intestine was already beginning to improve under its collateral circulation. Possibly the temporary relief of intra abdominal pressure while the abdomen was open may have contributed to the favorable outcome. The abdomen was closed without operative interference with the intestine or mesentery and a good recovery followed.

Immediate recovery does not end the patient's danger. The impairment of the intestinal circulation and the large amount of transudation of bloody serum through the peritoneal surfaces may lead to subsequent multiple obstruction from mass adhesions. In one such case it was necessary three years after the attack to anastomose the ileum into the descending colon.

With improved methods of operation and especially with the development of safer anasthetics and technique of inducing anesthesia these cases can come to operation early with greater assurance of success. Such cases furnish a fertile field for clinical and experimental study of the sequence of events leading up to and following occlusion of the mesenteric vessels.

CARL E. BLACK

EXCISION AND REPAIR IN THE TREATMENT OF CANCER

TWO seemingly divorced fields of surgery during the past few years have received much discussion and intensive study. In the one the surgeon has received the advice and experience of interested and

enthusiastic observers who have approached the treatment of malignancy from many angles other than surgical removal. In the other a comparatively small group of surgeons with careful attention to nomenclature with original thought and trial have refined the details of tissue transference to a point at which anyone following their descriptions may successfully accomplish the most satisfactory of all efforts—construction particularly that which we speak of broadly as plastic surgery.

The discussion of these two fields together may seem strained but it must be apparent that the fundamental effort of one by whatever agent is destruction while the whole purpose of the other by whatever method is construction. If two diametrically opposed surgical principles are merged may not the result of equalization or at least neutralization be expected?

The treatment of cancer is one of the most interesting if not the liveliest problem in surgery today. The uncertainty of cure by any method the multiplicity of form not only in relative pathological activity but of location and superimposed changes are enough to stir one's interest from purely scientific reasons while the horrible picture of the terminal case can only emphasize the importance of the study if we are to hold to the humanitarian aspects of our profession.

The introduction of new and valued agents of destruction into the treatment has now increased the modes of attack to a point where we must decide upon the merits of surgery select this or that agent alone or in combination. Combination brings up the added question of sequence.

A mere rehearsal is sufficient to explain the ever increasing uncertainty. Is excision with or without dissection of nodes cautery excision with or without dissection, cauter

AN OPERATION FOR INCONTINENCE OF URINE FOLLOWING PERINEAL PROSTATECTOMY

By EDWARD L. KEYES M.D. F.A.C.S. NEW YORK CITY

PERINEAL operations usually prostatectomy that result in incontinence of urine leave a field for operative repair in which the surgeon has very little musculature to work upon. Dr. Young has reported relief of incontinence by suture of the internal sphincter from within the bladder, yet one cannot but feel that this operation would very frequently fail and would perhaps if it succeeded entail an unwelcome return of the retention of urine.

The operation to be described is offered as one that can always be performed without grave danger to the patient and without the least risk of bringing back obstruction at the bladder neck.

The operation was performed upon a man 70 years of age who following perineal prostatectomy a year previously had suffered from constant complete loss of control of urination day and night ever since. (A history of chancre in youth and mercurial treatment at that time led to the suspicion of cerebrospinal luës but normal reflexes and a negative blood Wassermann sufficiently ruled this out.)

The region of the prostate as felt by rectum was occupied by a hard nodular mass all across the pelvis and seemingly part of the perineal scar. Because of the hardness of this carcinoma was at first suspected. X-ray examination was negative.

The urine showed a few pus cells, a few hyaline casts, a good concentration (1020). Phenolsulphonephthalein output was 20 per cent in the first hour, 20 per cent in the second. The systolic blood pressure was 125.

The patient's general condition was neurasthenic. He had sought vainly for relief at various hospitals and declared himself ready to commit suicide if he could not be helped. He had lost 40 pounds in weight.

The operation was performed on October 16, 1923. Through the usual V-shaped incision the perineum was opened in the line of the old scar and the rectum separated from the urethra. Inadvertently the membranous urethra was opened so in order to insure a dry wound counter drainage was made suprapubically. Returning to the perineum the hole in the membranous urethra was closed with plain catgut. Some little dissection was done in the hope of finding some fibers of the external urethral sphincter but the membranous urethra seemed to be completely surrounded by scar and no muscle fibers were found. Indeed the only muscles in sight were the cut and scarred posterior end of the bulbocavernosus

the edge of the intact levator ani on each side and the rectum behind. Lacking any other method of bringing pressure upon the urethra it was decided to attempt to bring muscular pressure upon this by suturing together the two levators with the posterior part of the bulbocavernosus. This was very easily done after the bulbocavernosus had been freed from scar. The three muscles were brought together by three interrupted sutures of chromic gut. They made a muscular bed the bulbocavernosus holding the two levators forward snugly under the membranous urethra upon which the natural tension of the levators gave an upward tug.

The patient was in the hospital a days less than 3 months during which time he gradually gained weight (from 127 to 137 pounds) and courage. His suprapubic opening was permitted to heal 3 weeks after operation and for a week thereafter he had little control of his urethral muscles. Then he began to be dry at times and on November 25 (about 7 weeks after operation) he was for the first time dry all night but had passed his urine two or three times during the night. When he left the hospital on January 14, 1924, he was dry at night but was unable to control his urine by day except while sitting down. As soon as he walked about he complained of marked urgency and desire to urinate which if not heeded would result in incontinence.

This condition gradually improved until October, 1924, 11 months after operation when he reported that he was perfectly well, still arose twice at night to urinate but could hold the urine half the day, had regained 30 of the 40 pounds which he had lost before operation and had no leakage excepting a few drops when he sneezed.

A month later he was shown at the New York Academy of Medicine and now in June, 1925, he does not arise at night, he does not leak under any circumstances, he has not leaked a drop in several months.

This operation was performed on the theory that the difference between complete incontinence and complete dryness is not the difference between a wide open faucet and a tightly closed faucet but rather the difference between a faucet that drips very slightly and a tightly closed faucet. Consequently one may expect occasionally at least to close such a dripping urethra by relatively slight or indirect muscular pressure. The use of a sling made by junction of the edges of the levators to the bulbocavernosus is suggested as a means of providing such support of a firm and stable character and by means of an operation which seems relatively safe both in its immediate and in its ultimate consequences.

tions to destruction in position will always remain, while the fearsome objection to excision has been largely erased by the wonderfully successful procedures of tissue transference. And those of us who believe that the hope of a cure is a local growth widely removed can approach and offer our patients plans not only for a cure but for reconstruction.

The more frequent use of the full thickness graft in the Wolfe-Krause form is a great forward step. With attention to details and selection this graft revascularizes and leaves a hardly appreciable scar and it is of great use in exposed areas. The small deep graft of Davis does not yield such good cosmetic results and is not to be considered for exposed places. It has its greatest field in hastening the healing of granulating surfaces following cautery excision.

The Ollier-Thiersch form is by no means to be discarded but its limitations are more to be recognized principally in its greater tendency to contraction and color loss. It is well known that this graft will take on the function of mucous membrane and again with attention to details will take in the mouth in spite of the unfavorable field. There is also much keener understanding of the differences between grafts and flaps and a fuller appreciation that these are two distinct principles

entirely separate in their application. The use of the flaps—the sliding, the jump, the tubular—the delayed—the possibility of transferring grafts as a part of the flap to make two-sided epithelial coverings for the cure of defects of nose and cheeks, New's delayed flap on the palate not only of inestimable value in congenital cleft palate but for closure of all defects of the palate or alveolar process—the splendid work in reconstructive dentistry—the study of compounds for prosthetic models—these procedures and their accomplishment all indicate that we must inject into the treatment of cancer not only the effort at cure but also that of repair.

This is surely no new thought but one waiting development with the anticipation that cases will group themselves along lines of pathology and selective reconstructive steps. Groups in which is indicated keen excision and immediate repair, others in which cautery excision may be used followed by delayed either early or remote repair. The wisdom of excising all areas apparently cured by other means must also be considered.

While there are many paths from out the Wilderness of Cancer Treatment that which appears broadest and most direct is a local growth widely removed either primarily or secondarily and the substitution of tissue of known value.

HARRY P. RITCHIE



Fig 3 Green stick fracture (Case 3)



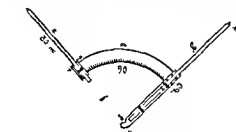
Fig 4 Photograph of operative field (Case 3)

according to the classical technique and (in view of the impossibility of making one in the lateral position) another vertical film shifting the focus of the tube above the shoulder and the film downward but this is difficult to accomplish. It occurred to us then to take advantage of the use of oblique projection of the rays and by taking pains to make the two roentgenograms with rays projected at right angles to find the equivalent of the two right angled planes of observation used with bones of the extremities the trunk and the head.

This we have succeeded in doing with great precision by means of an instrument (Fig 5) which consists of a quadrant of 90 degrees (a) with a perpendicular arm mounted at either end one (b) sliding in a tunneled support (c) which is further armed with a concave beak (d) to fit the contour of the clavicle the other arm (e) also sliding in a somewhat shorter tunneled support which can be moved the entire length of the quadrant and whose length is sufficiently reduced

to permit it to be slipped along the quadrant over the shoulder however broad may be the opening (f) which it leaves.

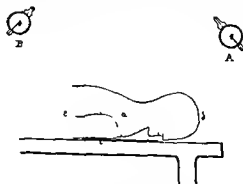
The simple arrangement which we have devised is clearly shown in the accompanying sketch (Fig 6) the subject (a) to be examined is laid face down upon the table a film (b-b) is placed under the clavicular region (c), and the tube placed in the position 1 the rays centered parallel to the axis of arm b (Fig 5) of the apparatus and we make the first roentgenogram from above down that is from the head (d) obliquely downward toward the trunk (e). Then we change the film (or we may employ a large one dividing it into two parts covering the half not in use with lead) and center the rays from point B following the axis of arm e (Fig 5) of the apparatus, and we expose the second roentgenogram from below upward that is to say from the trunk (e) obliquely toward the head (d). In making the first roentgenogram it is important to push the film a



Construido en la
Escuela de Cirujia
3 Octubre de 1930

16 ED

Fig 5 Adjusting instrument a Quadrant b perpendicular arm c tunneled support d concave beak e perpendicular arm f opening



16 FD

Fig 6 Sketch showing the patient on the operating table and the position of the instrument when it is in use

tions to destruction in position will always remain while the few objections to excision has been largely erased by the wonderfully successful procedures of tissue transfer. And those of us who believe that the hope of a cure is a local growth widely removed can approach and offer our patients plans not only for a cure but for reconstruction.

The more frequent use of the full thickness graft in the Wolfe Krause form is a great forward step. With attention to details and selection this graft revascularizes and leaves a hardly appreciable scar and it is of great use in exposed areas. The full deep graft of Davis does not yield such good cosmetic results and is not to be considered for exposed places. It has its greatest field in hastening the healing of granulating surfaces following cautery excision.

The Ollier Thiersch form is by no means to be discarded but its limitations are more to be recognized principally in its greater tendency to contraction and color loss. It is well known that this graft will take on the function of mucous membrane and again with attention to details will take in the mouth in spite of the unfavorable field. There is also much keener understanding of the differences between grafts and flaps and a fuller appreciation that these are two distinct principles

entirely separate in their application. The use of the flaps—the sliding the rump the tubular the delayed, the possibility of transferring grafts is a part of the flap to make two sided epithelial coverings for the cure of defects of nose and cheeks, A new delayed flap on the palate not only of inestimable value in congenital cleft palate but for closure of all defects of the palate or alveolar process. The splendid work in reconstructive dentistry the study of compounds for prosthetic models—these procedures and their accomplishment all indicate that we must inject into the treatment of cancer not only the effort at cure but also that of repair.

This is surely no new thought but one waiting development with the anticipation that crises will group themselves along lines of pathology and selective reconstructive steps. Groups in which is indicated keen even toward immediate repair, others in which cautery excision may be used followed by delayed either early or remote repair. The wisdom of excising all areas apparently cured by other means must also be considered.

While there are many paths from the Wilderness of Cancer Treatment that which appears broadest and most direct is a local growth widely removed either primarily or secondarily and the substitution of tissue of known value.

HARRY P. RICHIE



Fig. 13 Stereoröntgenogram of case shown in Figure 12



Fig. 14 Same case as that in Figure 13 with exposure by new method from above downward

approximation (a) with slight separation of the fragments (b and c) and the clamp (d) in an oblique projection. The roentgenograms obtained by our new technique gave very interesting pictures in one of them (Fig. 8) taken from above down (tube position 4 Fig. 6) we see the clamp (d) in profile in all its details (bony union being conspicuous by its absence) anchored by one of its points to the internal fragment (c) and absolutely detached from the external fragment (b) the two halves of the clavicle widely overriding in the other (Fig. 9) taken from below upward (tube position B Fig. 6) we find the clamp in a position at a perfect right angle to that shown in Figure 8 recognizable only by one of the sides (its back) as forming part of an ideal bony approximation (a) giving no cause to suspect the marked overriding which we know exists. This latter film also shows the true curve of the normal clavicle.

One may then as we demonstrated before the Peruvian Surgical Society at its session of October 15 1924 make roentgenograms of the clavicle in two positions at right angles as is done with other long bones which permit better study of the pathological roentgen anatomy of its fractures or other lesions and make a proper postoperative check up of the results. We have also demonstrated that the images produced are not distortions of the clavicular shadows this is proved by the accuracy of the shadow of the clamp in Figures 8 and 9 and what is more important by the normal shadows of the clavicle on the uninjured side (Figs. 10 and 11) which show the characteristics of the clavicle as we are accustomed to see it in the classical anatomy of this bone in the roentgenogram made from above down (Fig. 10) the clavicle appears with its lineal borders (a) as a straight

line such as this bone presents when seen in profile in osteology but with the film made from below upward (Fig. 11) we find the normal S curve which we should see when we observe the bone from either of its faces. We have recently operated on this patient to extract the disturbing metallic clamp which had become displaced and useless and we were able to verify the accuracy of our roentgenological conclusions.

The following case was selected by us to test the exactitude of a pre-operative diagnosis made by our procedure because, an open operation being indicated we would be able to realize *de visu* the operative anatomical and pathological demonstration. Naturally for comparison we made in advance an anteroposterior roentgenogram by the commonly accepted technique as well as a pair of stereoscopic films. The roentgenogram by the classical technique (Fig. 12) showed us an internal fragment (a) with beveled end and an external fragment (b) with a forked end—nothing



Fig. 15 Same case by new method from below upward.



CRAWFORD W LONG
1815-1878



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Fig 15 Same case by new method from below upward

from the greatest university of his day he soon acquired a large practice and became a social favorite as well

Dr Long married Miss Caroline Swum daughter of the president of the University of North Carolina. Fourteen children were born to them two of whom Miss Emma Long and Mrs Frances Long Taylor are still living in Athens Georgia where the family moved in 1851. They are the custodians of an enormous amount of literature that has gathered around the history of their father's great discovery

The inhalation of nitrous oxide to produce mental exultation, or a species of intoxication was known and practiced during the early part of the nineteenth century, both in Europe and America. The introduction of this custom was due originally to certain chemists and later its use was broadcast by itinerant lecturers. It was noticed that when the inhalation of nitrous oxide was pushed far enough stupefaction ensued and the subject became unconscious. Wells (1844) got his inspiration from this source and the next day had one of his sound molars extracted while he was under the influence of the gas. Mr Davey, afterward Sir Humphrey called attention to the effects of nitrous oxide as early as 1800 and suggested that probably it might be used to prevent the pain of a surgical operation. In the same year William Allen demonstrated the phenomena of nitrous oxide inhalation to Sir Astley Cooper at Guy's Hospital noting especially the loss of sensation to pain. While that famous surgeon had eyes to see and ears to hear his spiritual vision failed to discern the wonderful secret that was revealed before him, and for which the profession had sought since the beginning of time. And the world shuddered on under the agony of the surgeon's knife.

It was also observed that sulphuric ether which had set upon the Apothecaries shelves for three hundred years would produce exultation and stupefaction as did nitrous oxide. Faraday said in 1818. When the vapor of ether mixed with common air is inhaled it produces effects similar to those of nitrous oxide gas. Ether by inhalation to relieve the spasm of asthma and phthisis was used by Pearson of England as early as 1795. Numerous American physicians employed ether for the same purpose. However it was the social use of both ether and nitrous oxide to produce a pleasurable exultation for which they were chiefly used. Prof Thompson of Edinburgh frequently entertained his students by exhibition of the exultating effects of both sulphuric ether and nitrous oxide. But no one coupled up the anæsthetic effects of ether with a surgical operation.

While Crawford Long was attending lectures in Philadelphia the inhalation of ether to produce mental excitement according to Mitchell was common practice among the lads in that city. It is of record that Long indulged in the favorite pastime himself. The same custom prevailed in New York.

Shortly after Dr Long located in Jefferson he introduced the use of ether by inhalation for its exultating effect. Dr Long's ether frolics soon became

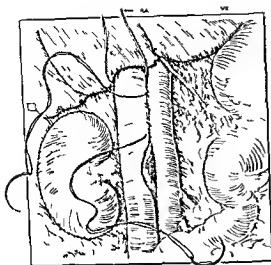


Fig 1

retractor 1 placed in position and the operator's hand is placed on the vena cava side with the assistant's on the portal side in such a way as to provide the exposure shown in Figure 1.

The method devised is similar to some types of lateral intestinal anastomosis. Further steps in the operation are described by illustrations and legends (Figs 1 to 7).

The operative field (Fig 1) is exposed by retraction of the liver, stomach and duodenum and by division of the right hepatorenal ligament. By blunt dissection the portal vein is stripped of fascia, fat and lymphatics so that the tributaries are seen. A heavy braided silk ligature is threaded around the vena cava next to the liver reflection. It is not tied until the anastomosis is completed. The assistant rotates the portal vein to the left and a posterior row of doubled C silk on a No. 5 French needle is placed. It is important to stitch as far posteriorly on both veins as possible. The hepatic artery is buried progressively as indicated.

The posterior row of sutures is complete (Fig 2). It is from 2.5 to 4.0 centimeters in length depending on the size of the dog. Stitches to be used for the anterior row, I and F, are tied into the knots at the end of the posterior row.

The haemostatic suture E (Fig 3) is accurately placed beginning where the knot in the doubled thread is shown. The first and last stitches effectively close over the ends of the tuck raised in the portal vein. The vena cava is thick walled and needs only the closer placing to effect this purpose on its side. The spaces B should be

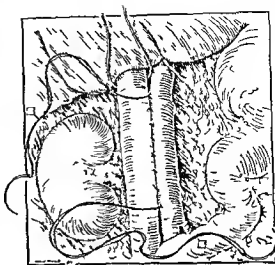


Fig 2

smaller than the portions covered by thread ensuring haemostasis. The space C in the portal vein should be as long as the space D in the vena cava. Otherwise there may be difficulty in cutting the top from the tuck in the thin walled portal vein.

The haemostatic suture E (Fig 4) is pulled tight from both ends. This is done before the last stitch of the haemostatic suture is taken in the portal vein and vena cava. After this last stitch is completed a tight pull suffices to lock the suture and the ends may be dropped. A single stitch of the anterior row F is placed at the upper end but is not tightened.

The assistant tightens and somewhat elevates the lower end of the haemostatic suture while the operator cuts off the top of the tuck first from the vena cava then from the portal vein. Smooth thumb forceps and curved scissors are used. An elliptical strip of vein from 1.5 to 4.0 millimeters wide and from 2.0 to 3.5 centimeters long is removed. The haemostatic stitch may again be dropped or if there is slight leakage at any point when unsupported held lightly.

In Figure 5 we see that each vein has been opened for a distance of from 2.0 to 3.5 centimeters.

In Figure 6 the haemostatic suture E is still in place. The anterior row of stitches F and F' is inserted from each end as a continuous infolding stitch. It is pulled up loop by loop from the vena cava side while the assistant makes sure of invagination of the cut veins. The knot is tied and the ends are cut.

investigated this subject, admits that Crawford Williamson Long was the first to employ sulphuric ether as a surgical anæsthetic. Many papers, pamphlets, and a few books have been written setting forth in great detail the history of Long's discovery. Numerous monuments have been erected to his memory. Many scientific bodies have declared their belief in Long's priority. His Alma Mater in 1910 unveiled a medallion with imposing ceremonies to commemorate Long's discovery.

In 1902 Congress enacted a law authorizing each State to place a statue of two of its most distinguished citizens in Statuary Hall which is located in the Capitol directly under the dome. The State of Georgia through its Legislature selected Crawford W. Long and Alexander H. Stephens as its most illustrious representatives. In March of this year the Memorial Association of the Discoverer of Surgical Anæsthesia will unveil in Statuary Hall a statue of Crawford W. Long made of Georgia marble by the famous sculptor, J. Massey Rhind, New York City.

That Wells in 1844 used nitrous oxide as an anæsthetic and Morton in 1846 employed ether disguised with aromatics and under the patented name of 'letheon,' does not in any way invalidate the fact of Long's priority claim as the discoverer of surgical anæsthesia in 1842.

In the ringing words of Henry W. Grady: It was Crawford W. Long who gave to the world the priceless boon of anæsthesia. When Edward VII was operated on for appendicitis his first question on awakening was 'Who discovered anæsthesia?' His surgeon Sir Frederic Treves answered: 'It was an American, Your Majesty, Crawford W. Long.'

JOHN WESLEY LONG





Fig. 8



Fig. 9

dog recover from ether as the wound is closed and in excellent condition. No special postoperative care is needed.

COMMENT

Several points in technique are important. As mentioned by Bernheim and Voegtlin (2) double silk should always be used; the two strands filling up the needle hole effectively. We have found too that oiling makes the silk slip through the vein walls more easily. In the continuous suture of veins each stitch should be put through the thicker walled vein last before tightening. This prevents tearing. If any point should bleed perceptibly a bit of muscle placed over it with the application of light pressure will stop it. If a needle break leaving the pointed half in a thin walled vein take another stitch close by; continue sewing until ready to pull up; then remove the fragment backward and tighten the suture.

The main advantages of the method may be summarized in this manner:

1. No special instruments or specialized operative technique are necessary.

All steps are carried out deliberately under the direct vision of the operator.

3. The opening is oval, not linear.

4. There is no limitation within reason as to the length of anastomosis which can be made.

5. Vein much smaller than the portal of the dog may be anastomosed.

6. There is no puckering of vein wall with possibility of valve-like flaps or inclusion of tributaries as in methods which require a mattress suture for closing over the end of the anastomosis (2).

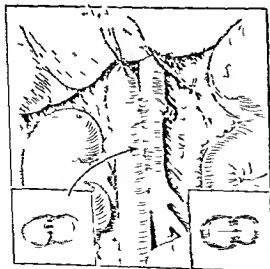


Fig. 10

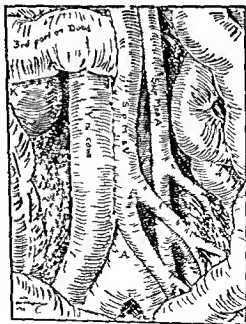


Fig. 11

enzymes. I have found similar results except with this degeneration you get a marked degeneration of the brain when you use spermic injection.

I would like to know if Dr. Fogelson found similar changes in the brain. This work suggests a new theory in dementia praecox which sets out to show that there occurs a destruction or auto destruction of spermatozoa in the individual with degeneration of the brain tissue. The agglutinins are probably the most important and if one could work that out it would throw most light on the question of sterility.

While this paper is extremely interesting and is going to open a new line unless you carry it through you are going to be led into blind alleys. In other words you have to use the same animals in the beginning as in the end of your experiments.

Dr. MAYA GOLUSTINE. I think this paper reasonably eliminates any idiopathic sterility when both sides are apparently normal and also the theory that the vaginal secretion can clump the spermatozoa and so prevent pregnancy. Of the 11 cases that Dr. Fogelson spoke of 7 are pregnant. One of them has one child delivered November 13, 1921. We will probably have to eliminate the clumping of the spermatozoa by the vaginal secretion as a factor in causing sterility and look carefully for gynecological troubles. After these troubles are of minor character and when corrected pregnancy follows.

Dr. A. S. HEANEY. Will Dr. Fogelson tell us the technique he used in the 12 human cases to deter-

mine whether there was clumping of the sperm with the secretions of the female?

Dr. S. J. FOGELSON (closing). In answer to Dr. Schochet to use the same animal would be impossible. The animal was destroyed and the spermatozoa were taken out and placed in isolated solution.

Dr. Schochet's point is very well taken but the clumping is another factor he apparently overlooked. To wit it has been demonstrated that in rodents at least normally there is invasion of the genital mucosa by spermatozoa. This recently has been reported by numerous workers in California. If that occurs normally we can eliminate this static and dynamic factor which is present in sterility.

In regard to autopsy on the rats I did very little microscopic work on sections of the brain. Grossly there were no changes. I am not in a position to state whether that is a factor even though it occurs. If invasion of the mucosa does occur we can cease to worry about static and dynamic effects because this is a normal state of affairs.

In regard to the clumping found in the cervical secretion we were very careful in all these patients at the time we were doing the Rubin air test to obtain smears from the cervical secretion. We determined the hydrogen ion content here with variations from 10 to 13. With that as a basis we took the cell or extracts of our smears and tested them out in hanging drops with spermatozoa.

CORRESPONDENCE

FINAL RESULTS OF OVARIAN GRAFTING

To the Editor I have read with much interest Dr W Blair Bell's article on Ovarian Grafting in the December 1925 issue of SURGERY GYNECOLOGY AND OBSTETRICS

The favorable results as mentioned by the author appear to me as extraordinary especially when I recall my own experience in ovarian grafting. Considering the marvelous results claimed by Dr Bell I have sometimes wondered if the technique I use is not defective but the more I compare Dr Bell's technique with my own the less I find any material difference between the two. I will describe the technique I use.

The ovarian tissue is carefully separated from the structures surrounding it. It is temporarily wrapped in a compress saturated with hot serum (40 degrees C) during the primary operation and until it is time to implant it. After the ovary is scarified it is carefully placed in a pouch produced by separating the peritoneum and the posterior face of the rectus. The peritoneum and the abdominal wall are closed with the ovarian tissue implanted in the extra abdominal pouch.

It was in Paris during the year 1916 that following the example of Tuffier I began to use this method of ovarian autografting. Since the war back in Canada I have used the method in 5 cases in patients who had undergone an operation for double salpingo-ovariitis without hysterectomy.

In the December 1923 issue of *L'Union médicale du Canada* I reported the results obtained as follows. In our experience while the results obtained in ovarian grafting have not been encouraging on

the other hand the ovary grafted has never caused serious trouble and has apparently ultimately undergone sclerotic degeneration. In some patients (three) there was an absence of artificial menopause disturbances but such a condition was quite prevalent in patients in whom ovariectomy had been done without ovarian grafting. The menstrual flow would continue for some time when a few ovarian cells had been left intentionally or not in the pedicle.

And thus my experience leads to this conclusion that medical and surgical therapeutics have failed in cases of ovarian insufficiency brought about through ovariectomy that our knowledge of ovarian physiology is rather limited that though it is sad to admit defeat after such tenacious effort it is best not to court delusion any longer through the practice of insufficient methods but rather to try to find by working with physiologists some other means of dealing with the ovaries such as those we now use in dealing with the thyroid.

I may state as does Sauvé who has experimented in ovarian grafting that one cannot scientifically infer that anatomical integrity becomes physiological integrity.

To demonstrate the truthfulness of this statement I will describe briefly a case which I believe is conclusive. It is probably also the only case reported in the medical literature.

In September 1925 a patient upon whom I had operated 5 years previously (1920) for bilateral lesions of the ovaries and the adnexa came again to my surgical clinic. As I had made it a practice

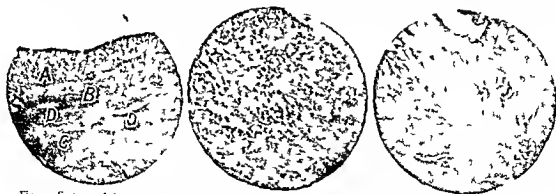


Fig 1 Sections of the ovarian tissue 5 years after a grafting. Section I A Stratum granulosum B theca C stroma D blood vessels. Section II A B D enlarged. Section III Stroma enlarged.

CONSTANTINI

AFRICANI MEDICI DE HVMA

na natura, uel de membris principalibus
corporis humani, Liber I.

De cerebra.



Erebrum natura frigidum & humidum est, ideo ut & facile ad susceptionem diuersorum conuerteret, & ut moruentibus membris mobilitatem præstaret, & ut calido & sicco spiritui ad caput exhalanti temperiem inferat. Cuius miringa frigida est & sicca & tensa. Infra quam sunt diuisiones tres. Prima dicitur phantastica. Secunda rationalis. Tertia memorialis. Inter phantasticam & rationalem est pannus quidam frigidus & siccus, & depressior eo qui diuidit inter memoriam & rationem, habens in se modicum tenuissimæ carnis. Ex memoriali uero procedunt duo cānales tenues & humidi, ut medulla spinalis quæ penetrat ut compaginē totam, & ueniunt usque ad phantasticam cellam, per quos possit phantasticus spiritus & rationalis commendari memoriæ, & iterum memorialis duci ad rationem & phantasiam.

De auribus

Cuius auri supraponitur unum os frigidum & siccum, & sine spiritu quæ inferius adhærent illi tenui panno qui diuidit inter phantasiam & rationem. Quibus sunt singula foramina, in obliquum facta, habentia tenue inuicem ab ipso panno. Quæ intrinsecus habent indumentum tenuissimum frigidum tum & siccum, per quod ducitur spiritus ab ipso interiore panno, præstans auribus uirtutem audiendi. Et est audibilis qualitas calida & humida, ut qualiscunque sonus infertur auri ab humiditate suscipiatur, à calore attrahatur ad cerebrum, ut sciatur qualis sit. Siccitas uero ossium ad hoc est, ut tinnitus in eis per eque obseruetur, secundū exteriorem euentum.

De oculis

Oculorum autem tres sunt tunice interiores frigidae & humidae. Prima est ut aqua coagulata lucidissima in qua uirtus uisibilis est. Secunda est ut tenue oui album. Tertia ut utrum modicum esse habens

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CONSTANTINI

AFRICANI MEDICI DE HUMANA

natura, uel de membris principalibus

corporis humani, Liber 1.

375

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EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

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MARCH 1926

MESENTERIC VASCULAR OCCLUSION

THE subject of mesenteric vascular occlusion is involved in considerable confusion and on account of the high mortality little effort has been made to disentangle the diagnostic signs and symptoms of these accidents which involve the intra abdominal viscera. Embolus and thrombus of the mesenteric vessels are not infrequent accidents and are rarely diagnosed prior to the opening of the abdomen for operative or postmortem purposes.

In clinical diagnosis the first element of confusion is that many authors include embolus and thrombus as causes of intestinal obstruction without differentiation. It is true that they may cause obstruction. Another element of confusion is the difficulty of determining on the operating table whether the trouble is in the vein or the artery and whether it is from an embolus or a thrombus. Still another element of confusion is that so large a proportion of the reported cases are postmortem studies which never received surgical analysis during life. This difficulty has led at least one prominent writer to coin the

term "mesenteric vascular occlusion" as sufficiently inclusive to fit all cases.

A study of the literature would lead one to conclude that surgeons coming on the condition unexpectedly at the operating table have not made much effort to trace back the clinical history for diagnostic signs and symptoms for future guidance. In fact, a large proportion of these cases seem to have been considered as terminal conditions of long standing cardiovascular disease and they are not given serious surgical analysis. We must admit the difficulty of pre operative diagnosis yet the condition has very definite signs and symptoms especially in the more acute cases. The presence of an acute abdominal condition in a patient in which the cause cannot be made out and especially in one having well marked cardiovascular sclerosis should always put the surgeon on guard for the possibility of a 'mesenteric vascular occlusion'. While in embolus the insult is much more acute in thrombus the symptoms bespeak an increasing area of intra abdominal involvement extending over a varying length of time. The symptoms which involve only a vascular branch are necessarily different in both degree and intensity from an involvement of a main vessel. If prompt recognition of the condition which involves only moderate areas could be developed surgical intervention would yield good results. A review of the literature beginning with the exhaustive studies by Porter, Jackson and Quimby published in the *Journal of the American Medical Association* in 1904 and a few later writers, shows serious attempts to secure a better basis of the causal signs and symptoms of occlusion of a mesenteric vessel.

ization in position with or without regard to heat penetration quite a number of electrical principles of which endothermy is the newer one, chemicals in several combinations, radium with various plans of application introduction degree of dosage filtration time and frequency of treatment, X ray involving the same questions with penetration depth added. Possibly in the future serology may enter into trial. With a host of clinical pictures on the one hand with an ever increasing group of agents on the other the question of treatment presents many phases.

Surgery either as a primary effort or secondary to assist the introduction of destructive agents will always maintain a place in the care of internal cancer because in no other way can the situation be determined. In external and accessible malignancy there is the inviting group for the study of the action of this great number of destructive factors.

Primarily all methods are studied and advanced with the hope of an universal cure but it is apparent that the multiplicity of situation precludes any such answer at least with our present knowledge. There is no single plan without very valid objections which are generally known. There appears a tendency in recent years to use that or those of one in support of the use of the other a tendency to place the treatment of cancer on a competitive basis.

Trial experience and accumulation of data are necessary to test the value of these plans and locate their use. There is no question but what the study is activated by the highest motives but it is equally true that concentration on one line whether it be surgery or otherwise leads to use without due consideration of the case. It may be an exaggeration to say that there is now a greater tendency than ever to apply treatment upon the blanket diagnosis of cancer.

With all these things in mind the indications of the future point positively and directly to the effort to group conditions not only with exact study of the cellular picture but with regard to location and careful consideration of superimposed and extraneous influences. Whatever pathologists may generally think of Broder's group, and it must permit of wide personal interpretation, nevertheless it presents a most important effort and may lead further in the grouping of cases in the consideration of plans for treatment.

Will it not be an advantage to pause in our discussion of the relative merits of agents and consider that the whole question of treatment revolves around the choice of only two possible methods of attack: excision on one hand destruction in position on the other. Upon which procedure lies the greatest expectation of a cure?

All attempts at destruction in position are open to an important objection—uncertainty of accomplishment. The result can be interpreted only by appearance. The possibility is ever present that activity is only arrested and not completely inhibited. The end result is contraction or scar formation of once diseased tissue remaining in place. All attempts at excision may end in loss of function or a cosmetic deformity. Such result is the most fearful. In fact it appears that fear of surgery and its scars is the most potent factor in causing the greatest handicap in the treatment of this disease—delay in seeking advice. The surgeon is also influenced with an estimable desire to leave a minimum scar to make a close instead of a wide excision.

Whether it will ever be possible to agree generally upon the relative merits of the primary procedures whether it will ever be possible always to recognize their limitations or formulate plans for their use in combinations, it is nevertheless true that the objec-

Libenthal's work will appeal as the standard reference book in this branch of his specialty

RALPH BOERNE BETTMAN

IN an effort to evaluate the axial changes of the spine the diagnostician must take a broad viewpoint. Many of these changes involve the adolescent girl and may have serious bearing on her future health in its relation to child bearing. In a monograph intended for practitioners Roederer and Ledent cover the subject of vertebral deviation completely. The causes, methods of examination, direct and differential diagnosis and the various treatments are clearly explained. The line drawings which indicate posture exercises will aid in popularizing this work on a special subject. Only accepted methods of treatment are stressed.

KELLOGG SPEED

LA PRATIQUE DES DYSPLASIES (Cyphose) By L. Roederer and R. Ledent. 1

IN undertaking the task of putting into one small textbook a description of the innumerable operative proceedings supposedly germane to the science of orthopedics Dr Steindler has performed a difficult task. Disappointment may be felt that the author in the numerical richness of operations described did not emphasize more the best and accepted methods to the exclusion of rather obsolete ones and did not also dilate more on his own results and conclusions.

In a few instances measures as yet unapproved by the test of time have been included for instance Royle and Hunter's work on spasmodic paralysis. The book represents much work on the part of one extremely well versed in the subject and its literature and every surgeon attempting orthopedic operations will appreciate the handiness of this monograph.

KELLOGG SPEED

A TEXTBOOK OF ORTHOPEDIC OPERATIONS By A. Steindler, M.D. F.A.C.S. New York: Lea and Co. 1925. Pp. 1111.

BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgment must be regarded as a sufficient return for the courtesy of sender. Selections will be made for review in the interests of our readers and as space permits.

ELEMENTS OF SURFACE ANATOMY for Students of Medicine. By J. MacLaren Thompson, B.Sc., M.B., Ch.B. (Edin.). Toronto: The Macmillan Company of Canada Limited, 1925.

TUMORS OF THE COLON AND RECTUM. Their Pathology, Diagnosis and Treatment. By Jerome M. Lynch, M.D., and Joseph Felsen, M.D. New York: Paul B. Hoeber, 1925.

I BELIEVE IN GOD AND IN EVOLUTION. By William W. Keen, M.D. 4th ed. rev. Philadelphia: J. B. Lippincott Co., 1925.

ANNUAL REPORT OF THE SURGEON GENERAL OF THE PUBLIC HEALTH SERVICE OF THE UNITED STATES FOR THE FISCAL YEAR 1925. Washington: Government Printing Office, 1925.

LA CURIETHERAPIE DES CANCERS. By Simone Laborde. Paris: Masson et Cie, 1925.

1. INCRÉTINES CHRONIQUES AVEC ICTÈRE (Causes, Diagnostic et Traitement), 2. VAISSER ET RÉSULTATS HIGIÈNES DE LA CHOL. CYSTOGASTROTOMIE. By Dr. Pierre Mallet-Guy. Paris: Masson & Co., 1925.

A PRÁTICA DA TELA SEZAL DO SANGUE. By Mano Pardo. Rio de Janeiro, 1925.

BIOLOGIE UND PATHOLOGIE DES WEIBES ein Handbuch der Frauenheilkunde und Geburtshilfe. Edited by Josef Halban and Ludwig Seitz. Lieferung 20. Berlin: Urban & Schwarzenberg, 1925.

LACTINOTERAPIA NEL NIOTIDROMIO UTERINO. By Prof. Mamei Spinelli. Naples: Vito Vito, 1925.

DIAGNOSTISCHE UND THERAPEUTISCHE IRRTÜMER UND DEREN VERHÜTUNG. Edited by Dr. J. Schwalbe. Vol. VII. Verletzungen und chirurgische Krankheiten der Mund- und Rachenhöhle, des Halses, einschliesslich der Speicheldrüsen, der Speiseröhre, des Kehlkopfes und der Trachea. By Prof. Dr. Paul Chiarmont. Leipzig: Georg Thieme, 1926.

ABDOMINAL OPERATIONS, Vols. I and II. By Sir Berkeley Mayhew. Philadelphia and London: W. B. Saunders Company, 1926.

KOLIKSIS. Rotary Lateral Curvature of the Spine. By Samuel Kleinberg, M.D. F.A.C.S. New York: Paul B. Hoeber, 1926.

LEITFADEN DER DIATHERMIE-BERATUNG. By Dr. A. Laquer. Berlin: S. Karger, 1926.

CHIRURGIE DER NIERE UND DER HARNLEITER. By Prof. Dr. James Israëli and Dr. Wilhelm Israël. Leipzig: Georg Thieme, 1925.

SIMPLECTOMIA PERI ARTERIAL. By Dr. Julio Cesar Ruys Morales.

This point of view further seems to conform with the somewhat anthropological theory of Le Demany according to whom the pathogenesis of dislocation is simply the static and mechanical result of a misplacement from an anthropological transformation of the pelvis. According to the theory of mechanical pathogenesis we must consider congenital dislocation of the hip as the result of chronic trauma to which the lower limbs and consequently the hip joints of the fetus are exposed in the second half of prenatal life. The flexion and external rotation of the lower limbs of the fetus, the lack of proportion which physiologically exists between the femoral head and the socket, the softness of the border of the socket, the physiological anteversion of the neck of the femur are all favorable conditions for an incipient dislocation which would manifest itself only after birth when the limbs of the fetus pass from flexion to extension and would appear more evident later when the joint has to carry the weight of the body. Personally we favor the theory of mechanical pathogenesis, but we do not believe that this theory explains every specific case. Dislocation can be the result of a number of factors of which the mechanical one is without any doubt the most frequent if not the only cause.

DIAGNOSIS

The second question which I wish to discuss concerns the diagnosis of the dislocation. It may seem strange to you that I place special stress on this argument because every one of you may be convinced that there is nothing new to be said about the diagnosis of congenital dislocation. Indeed this may be true when one is about to diagnose the deformity in a child who has already begun to walk.

The typical waddling gait is a sufficient symptom to make one suspect a dislocation and this suspicion is easily confirmed by the X-ray. But I wish to emphasize that it is of the greatest importance to recognize the dislocation as early as possible, even before the child has begun to walk. Therefore it is necessary to appreciate symptoms that are not generally known or to which no importance is given. These symptoms can be summarized as follows. If the dislocation is unilateral the

cutaneous creases of the thigh so evident in the infant are no longer symmetrical. On the dislocated side they are proximally displaced, the inguinal and gluteal pleats are deeper and longer than on the normal side. The outline of the dislocated hip is more prominent. The luxated limb has a tendency toward external rotation. Abduction is slightly diminished. Shortening is nearly always minimal but appreciable to the skilled eye. If the dislocation is bilateral there is no difference in length in the limbs but the pelvis appears enlarged because of the projection of the trochanters, the buttocks are flattened and the limb can not be normally abducted.

In those countries where congenital dislocation is frequent as for example in the northern part of Italy it happens frequently that the deformity is suspected by the mother even before the child learns how to walk. This is partially due to the propaganda which is intensively carried on to educate parents to bring their infants who show any tendency to dislocation at the earliest possible moment and place them under the observation and care of a specialist.

I am absolutely convinced that the practice of operating on the dislocation early will bring a decisive improvement in the results.

TREATMENT

Ordinarily in the treatment of dislocation I follow the classical method of Pacci which technique I need not describe. For the mobilization I follow in a general way the methods of Lorenz. Differing from what is commonly done in America I divide the immobilization periods in two stages in the first stage the limb is held in the classical first position of Lorenz for approximately 3 months during the second stage that lasts from 2 to 3 months the limb is immobilized in a minor degree of right angle abduction and in internal rotation. Great importance should be given to the physical treatment which must be undertaken when the period of immobilization ceases.

All that we have said refers to the bloodless method of treating dislocation a method which we may say has entirely replaced the open operation which as you remember

RESULTS

And now before closing let me say a few words as to the results

The improvement in technique which is the result of increased experience and the belief that we must treat dislocations at the earliest possible age are the principal factors in our improved statistical data. Our statistics for the year 1913 which include only 700 cases show an average of functional and anatomical success around 80 per cent for single dislocations and 60 per cent for bilateral. On the basis of 1,879 cases with 2,556 reductions we may say that we have succeeded in 90 per cent of the single dislocations and we have improved 65 per cent of the bilateral cases. By this I do not mean to say that the remaining cases are entire failures. Anterior transposition may sometimes (particularly in bilateral dislocations) produce results which are functionally just as satisfactory as those which are anatomically perfect. We must not forget that modern technique has taught

us how to avoid the greater number of those incidents which are apt to produce the greatest damage in unsuccessful treatment, such as fracture of the femoral neck and the paralysis of periarthritic nerves.

We are further convinced that the treatment of dislocation of the hip will in the future show results which will increase our present figures as regards successful cases. This will be easily accomplished when it becomes generally possible to begin the treatment at an earlier age than is now the case.

I have endeavored to outline the principal facts which should be known regarding deformity, a study of which is one of the most interesting chapters in the history of orthopedic surgery. I do not presume to have been able to give you a clear vision of this vast problem but even had I spoken at greater length I would probably not have succeeded in making the facts clearer. In discussing these subjects words are of little value if not accompanied by practical demonstrations.

MASTER SURGEONS OF AMERICA

CRAWFORD WILLIAMSON LONG

CRAWFORD WILLIAMSON LONG the discoverer of surgical anæsthesia was the scion of distinguished ancestors. His progenitors immigrated from the north of Ireland to Pennsylvania and Virginia. One grandfather, Captain Samuel Long fought through the Revolutionary War under Washington. Edward Ware, his maternal grandfather, was a sergeant under LaFayette. After the war the Longs of Pennsylvania and the Wares of Virginia moved to Madison County, Georgia where both Revolutionary heroes are buried, their graves being marked by the United States Government in commemoration of their patriotic services. James the son of Captain Samuel Long became one of the most prominent and influential men in Georgia. He married Elizabeth Ware and from this union sprang Crawford Williamson Long.

Crawford Long entered Franklin College now the University of Georgia, at the age of fourteen years taking the degree of A M at nineteen standing second in his class. His roommate and best friend was Alexander H Stephens who became vice president of the Confederacy. Young Long took one year of medicine in Transylvania University. From there he went to the University of Pennsylvania, graduating in two years, class of 1839.

To have graduated at the University founded by Benjamin Franklin is no mean distinction. The biography of the famous men who have taught or graduated there including Benjamin Rush almost makes the history of American medicine and surgery. During Long's attendance the Faculty included Philip Syng Physic the first surgeon to use buried sutures. William Gibson, who tied the common iliac and did two cesarean sections on the same woman. Nathaniel Chapman George B Wood Hoover Hodge Hare et al. These were the men who taught young Long. Wood never failed to admonish his students to be cautious in announcing new discoveries. Jenner waited twenty years before publishing his discovery of vaccination. Wood's teachings evidently left their impress upon Crawford Long.

Following graduation Dr Long spent eighteen months in New York City walking the hospitals. He gave special attention to surgery and attained an enviable reputation in his work. Returning to his native state Dr Long located at Jefferson a country village. Possessing a pleasing personality and coming

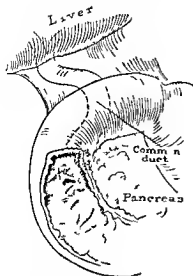


Fig 1 (Case 1) Stone 3 by 2 centimeters in the common duct just above the papilla

THE ABSENCE OF JAUNDICE

In 30 per cent of the chronic cases in which a stone is present in the common bile duct there may be no jaundice at the time of operation because of the fact that a movable stone in the common duct may not produce jaundice until it becomes fixed. Fenger was the first to explain and demonstrate a 'ball valve stone'. The history and operative findings in Case 3 are quite characteristic of such a condition. Again there may be a number of stones in the common bile duct and little or no jaundice until the distal stone becomes impacted in the duct after which there is obstruction and jaundice. Recently I operated on a patient (Case 8) whose only attack of jaundice had followed a gall stone colic 12 years previously. She had had frequent gall stone colics since that time but no jaundice. At operation three stones were removed from the common duct and two from the hepatic ducts. Palpation of the duct revealed their presence. The absence of jaundice in the presence of one or more stones in the common bile duct can sometimes be explained by the resiliency in the wall of the duct probably because there is little secondary infection.

Charcot's syndrome consisting of chills, sensations and fever is quite indicative of involvement of the common bile duct in a patient who complains of upper abdominal pains either before or during such febrile attacks provided the renal factor has been eliminated (Case 1).

THE PRESENCE OF JAUNDICE

Most patients with stones in the common duct have jaundice at one time or another following an attack of abdominal pain of which Case 9 is a typical example. Jaundice resulting from a stone in the common bile duct will usually diminish in intensity with the lapse of time. When the skin has become bile tinged as a result of the biliary obstruction it is often difficult to determine when the obstruction has subsided. The van den Bergh test makes it possible to estimate accurately the amount of bile pigment circulating in the blood serum from day to day.

Operation should be delayed when the bile in the blood serum is increasing. Sometimes this rule is followed with difficulty and yet experience has shown that an operation at such a time is performed with great risk even though the biliary obstruction is successfully

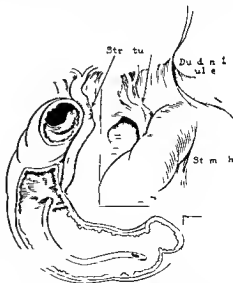


Fig 2 (Case 4) Reconstruction of a common duct with a McArthur catheter

quite popular in that part of the state. As the result of his observations of persons under the influence of ether he concluded that an operation might be performed while a patient was under its influence and without pain. But let us have the story in Long's own words. 'On numerous occasions I have inhaled ether for its exhilarating properties and would frequently, at some short time subsequent to its inhalation, discover bruises or painful spots on my person which I had received while under the influence of ether. I noticed my friends while etherized, received falls and hangs which I believed were sufficient to produce pain on a person not in a state of anæsthesia and on questioning them they uniformly assured me that they did not feel the least pain from these accidents. These facts are mentioned that the reasons may be apparent why I was induced to make an experiment in etherization.

"The first patient to whom I administered ether in a surgical operation was Mr James M Venable who then resided within two miles of Jefferson and at present (1849) lives in Cobb County Georgia. Mr Venable consulted me on several occasions in regard to the propriety of removing two small tumors situated on the back of his neck but would postpone, from time to time having the operations performed from dread of pain. At length, I mentioned to him the fact of my receiving bruises while under the influence of the vapour of ether, without suffering and as I knew him to be fond of and accustomed to inhale ether I suggested to him the probability that the operations might be performed without pain and proposed operating on him while under its influence. He consented to have one tumor removed and the operation was performed the same evening. The ether was given to Mr Venable on a towel and when fully under its influence I extirpated the tumor. It was encysted and about one half inch in diameter. The patient continued to inhale ether during the time of operation and when informed it was over seemed incredulous until the tumor was shown him. He gave no evidence of suffering during the operation and assured me after it was over that he did not experience the slightest degree of pain from its performance. This operation was performed on March 30 1842.

Dr Long continued the use of sulphuric ether as a surgical anæsthetic his operations being of record. He published his epoch making discovery by word of mouth to all with whom he came in contact by doing operations in the presence of reliable witnesses and by urging other physicians to use ether as a surgical anæsthetic until it was said that his method became 'notorious' throughout that part of the country among both the profession and laity. Later (1849) in a paper read before the Georgia State Medical Society and published in the *Southern Medical and Surgical Journal* he gave a full account of his discovery.

Documentary evidences of the above statements are published in *Old Penn*, vol xiv No 1 October 2, 1915, and elsewhere. They are so convincing that they cannot be gainsaid. Practically everyone, both in America and Europe, who has



Fig 5 (Case 5) Roentgenogram 3 weeks after operation showing tube in place



Fig 6 (Case 6) Roentgenogram showing catheter in place

stone (Cases 4 and 6 Figs 2 3 and 6) In a few cases in which operation had been performed dense adhesions formed around the duct, compressing it sufficiently to produce intermittent obstruction

THE SIZE OF THE DUCT

The normal common bile duct is approximately 7.5 centimeters in length and from 5 to 7 millimeters in diameter and appears bluish from contained bile. When it is affected either by infection or by obstructing stone its walls become thickened the color changes to yellowish white and the caliber is noticeably increased. These changes are indications for exploration of the duct even in the absence of jaundice or other symptoms of common duct disease.

In secondary operations on the common bile duct the relationship of the common duct the hepatic artery and the portal vein may be distorted as the result of the formation of scar tissue and if there is doubt as to the position of the duct a hypodermic syringe

with the needle as an aspirator is of great assistance in identifying it. Should the portal vein be mistaken for the common bile duct a needle puncture is of no consequence and bleeding can be controlled easily. The aspirating needle must be of sufficient caliber to permit the free entrance into the syringe of bile thickened by disease otherwise as a result of frequent needle punctures through the common duct there may be bleeding into its interior and blood instead of bile will be aspirated with the erroneous conclusion that the portal vein has been punctured.

REMOVAL OF STONES FROM THE DUCTS

Stones in the hepatic ducts unless firmly impacted often wash down with the first rush of bile into the common duct when the latter is incised. A delay of a minute or two after the incision is made gives time for such stones to appear. Stones only slightly impacted in the hepatic ducts can usually be removed with a common duct scoop if not

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD DECEMBER 18 1925 WITH THE PRESIDENT DR DAVID S HILLIS, IN THE CHAIR

REPORT OF CASE OF SARCOMA OF UTERUS

DR W C DANFORTH The patient was a woman of 63 years who had ceased menstruating about 12 years previously. She developed a tumor in the pelvis which was diagnosed by her physician as a fibroid. I later found a circumscribed tumor of the uterus which was freely movable. Material obtained by curettage showed a spindle cell sarcoma. Complete hysterectomy was done. The tumor was confined to the uterus except in one of the large veins of the right broad ligament into which there was an extension of the sarcoma. On the posterior wall there was a breaking through of the capsule. There was apparently no secondary growth. The woman made a good recovery and went home but soon developed a metastatic arthritis. She died about 4 months after the operation from cerebral hemorrhage. Up to the time I saw her last about a month before her death no secondary growth had developed.

Sarcoma of the uterus is rather rare. This is only the second one we have had in the hospital. The other one was not my case.

SURGICAL MANAGEMENT OF THE ACUTE ABDOMEN

DR W M THOMPSON read a paper on the Surgical Management of the Acute Abdomen (See p 368)

DISCUSSION

DR C W BARRETT In regard to peritoneal infections clinically we always think of the reactions against infection as a disease. We are mostly teachers here and in the light of our present knowledge of pathology our literature a few years hence is going to look rather peculiar when it refers to a patient dying from peritonitis, a salpingitis extending to a peritonitis, a local peritonitis extending to a general peritonitis, etc. In a case of peritonitis a patient is sick of the peritoneal infection and if the patient dies it is in spite of the peritonitis, not because of it. Peritonitis is a protective process as are all the other issues as well. It is perfectly possible for it to be protective in nature and yet in the end result in deleterious action. This explains the adhesions patients get with peritonitis intended to save the

patient adhesions may be produced that cause obstruction of the bowel and help to destroy the patient. We always should keep in mind that reaction after infection is for and not against the patient.

DR WILLIAM MCL THOMPSON (closing) This subject has interested me particularly along the lines Dr Barrett mentioned. One point is quite important. We are learning a great deal about acute abdominal diseases and as we do we are going to handle such cases much better. Two cases of rupture of the gall bladder and one of rupture of the common duct have been very instructive in the line of conservative handling and careful surgery, not too radical. As we learn the real pathology behind these cases and realize the part the peritoneum plays in protection we are better able to reduce our mortality.

NON SPECIFIC ANTIGENIC EFFECTS OF SPERMATOZOA UPON FERTILITY

DR S J FOGELSON (by invitation) read a paper on Non Specific Antigenic Effects of Spermatozoa upon Fertility (See p 374)

DISCUSSION

DR SYDNEY SCHUCHET I would like to ask Dr Fogelson if he uses the same male guinea pigs with the same litter in females? If not it will be difficult to discuss the paper. It is very difficult to express true enzymic action unless you carry out the experiments on a purely mathematical basis. Another fact difficult to understand and one of the most important in the study of enzymes is a static and dynamic element. The study of the static element is conducted in living tissues and of the dynamic in dead tissues. We all know for instance the action of pepsin on any protein and yet there is a difference in the action of pepsin obtained from the same animal. While you get a breaking down of the protein there is a difference in the relationship of the digestive action. From the standpoint of formal attack on digestion there is some effort taken in the stomach by digestion. This study has been carried out by Robertson.

In this other work we must recognize the static and dynamic factors and the question of sensitization of the spermatozoa in relation to follicular

the common or hepatic ducts the essential factor is the replacement of the affected tissue by tissue immune to the irritating effects of bile so as to prevent secondary strictures from the contraction of fibrous tissue as shown by Horsley

There are two methods of reconstructing the common bile duct for stricture. The first method is direct implantation of the duct or portion of the duct into the duodenum as performed by W J Mayo in 1905. Because of the union of mucous membrane to mucous membrane this operation is not marred by postoperative contracture of fibrous tissue and has given excellent lasting results. Such a procedure was used in Case 5 the stump of the hepatic duct being anastomosed to the duodenum over a short piece of catheter and cuffed to maintain it in position until union occurred at the anastomosis (Figs 4 and 5). Walton in 1915 modified the operation by using a flap of duodenal tissue as a tube and connecting the cut end of the hepatic duct to the duodenum anastomosis being made over a portion of a rubber tube.

The second method indirect implantation depends on the use of a rubber tube or similar structure to fill the gap between the cut ends of the ducts and the intestine. Sullivan who called attention to this method in 1900 suggested using a tube or piece of catheter to bridge the gap between the stump of hepatic duct and the duodenum covering the bridge with omentum and surrounding structures.

Propping advocated the use of a T tube to assist in the reconstruction of the common duct for stricture the upper shorter end of the tube being placed in the hepatic duct the lower end extending through the lower end of the duct into the duodenum with the perpendicular limb of the tube coming out through the abdomen. Although the T tube is still used in the plastic repair of such strictures the results following its removal have not been altogether satisfactory in some cases scar forms at the opening made in the duct for removal of the tube.

In cases of small stricture in the center of the common duct the stricture can be divided and a plastic repair made by using McArthur's method of inserting a catheter its

bell end being cuffed and placed in the hepatic duct and the catheter itself extending through the common duct down into the lumen of the duodenum through the ampulla of Vater (Cases 4 and 6 Figs 2, 3 and 6). The catheter establishes the continuity of the biliary tract and at the same time provides the scaffolding for plastic repair of the stricture. The tube can be maintained in place by catgut suture or by means of a silk thread passed through it brought out through the abdominal wound and fastened to the abdomen with adhesive. The silk thread is removed and the tug of intestinal peristalsis carries the tube out of the duct and through the intestines at the required time.

Another method of indirect implantation is the anastomosis of the fistulous biliary tract to the gastro intestinal tract. This operation was first performed by von Stubenrauch and failed. Later Murphy anastomosed the end of a fistulous biliary tract to the exposed lower end of a common bile duct and recently Lahey has reported two successful cases in which the fistulous biliary tract was transplanted into the duodenum.

In a very small group of cases in which operations on the biliary tract have been performed the attacks of pain and a retention type of vomiting similar to that of pyloric spasm persist. Exploration of the common duct in such cases may not reveal gross cause for the obstructive manifestations and yet when one passes an olive tipped probe through the lower portion of the common bile duct there is a distinct tug felt as it enters the ampulla and again as it goes through the sphincter of Oddi into the duodenum (Case 11). The same tugs are again experienced on the withdrawal of the probe so that this might be considered a possible cause of an intermittent obstruction in the common duct in the absence of other obstruction. Mechanical dilatation usually results in a subsidence of the symptoms.

PANCREATIC OBSTRUCTION

Obstruction of the pancreatic portion of the common duct may be a result of primary inflammation or it may be secondary to inflammatory conditions in the biliary tract or to a

CASE 4 A woman aged 34 had had cholecystectomy elsewhere in 1919 without relief from symptoms. During the last 2 years she had had 8 attacks of colic requiring morphine. Pain had been continuous in the upper abdomen for the last 5 months. Four weeks before examination jaundice appeared.

Examination revealed jaundice 3 and bilirubin (van den Bergh test) 9 milligrams July 16 1925 and 2.8 milligrams July 25. Test of hepatic function showed phenoltetrachlorophthalein retention 4. At operation a stricture of the middle third of the common duct and duodenal ulcer were discovered. Reconstruction of the strictured duct over a McArthur catheter with excision of the duodenal ulcer and gastroduodenostomy were followed by recovery of the patient (Figs 1 and 3).

CASE 5 A woman aged 64 had had cholecystectomy elsewhere for gall stones in December 1923. Two large stones were found in the gall bladder. A biliary fistula and jaundice had existed since the operation. At exploration elsewhere in April 1924 a stricture of the common duct was found but nothing was done.

Examination showed a draining biliary fistula and jaundice 2. A diagnosis was made of obstruction of the common duct and biliary fistula. At operation a stricture throughout the entire length of the common duct to the level of the liver was found and hepaticoduodenostomy was performed the hepatic duct being sutured to an opening made in the duodenum over a piece of catheter. The patient recovered (Figs 4 and 5) and the jaundice subsided. She has recently had a temporary return of the jaundice lasting a few days probably because of a temporary blockage of the tube.

CASE 6 A woman aged 41 had had cholecystectomy elsewhere with removal of many gall stones in February 1924. In March 1925 she had pain in the upper abdomen followed by jaundice for 2 or 3 days. A second attack occurred a week later and thereafter one occurred every 3 or 4 days. Morphine was required at times to relieve the pain.

Examination revealed slight jaundice. A diagnosis was made of recurring cholecystitis with stone in the common duct. At operation a stricture of the common duct 1 centimeter in length in the region of the cystic duct was found. The gall bladder was about 1.5 centimeters in diameter and did not contain stones. The stricture was cut and a reconstruction of the common duct was made over a McArthur catheter the lower end extending through the duct into the duodenum and the upper into the hepatic duct. The patient made a satisfactory recovery and has had no further colics or jaundice (Fig 6).

CASE 7 A man aged 63 had had gastric fullness 2 hours after meals for 2 years. Painless jaundice had begun in April 1924. He had lost 20 pounds and also much strength. Because of his poor general condition with the history of a painless jaundice it was decided to keep him under observation for a time before making a definite diagnosis.

The patient returned to the clinic June 24 1925 on account of an attack of excruciating pain in the region of the gall bladder which had lasted for 1 week. Jaundice had decreased in intensity since then. A diagnosis of cholecystitis and stone in the common duct was made and at operation a gangrenous gall bladder an impacted stone in the cystic duct enlargement of the common duct and dilatation of the ampulla were found. The gall bladder was perforated but the perforation was protected by omentum. A cholecystectomy and choledochostomy were performed. The patient recovered from the operation and has remained well (Fig 7).

CASE 8 A woman aged 46 had had gall stone colics for 21 years. Ten years previously following a colic she had had slight jaundice which disappeared. Although she had frequent colics during the last 10 years there was no evidence of jaundice. In the latter part of July 1925 she had had a similar attack of colic accompanied by fever of 102 degrees but no jaundice.

A diagnosis was made of chronic cholecystitis with cholelithiasis. At operation several stones were found in the common and hepatic ducts and removed. The gall bladder containing stones was removed. The patient recovered uneventfully.

CASE 9 A woman aged 37 had had gall stone colics requiring morphine since July 1923 with indigestion between attacks. Jaundice appeared in May 1925 following a severe attack of gall stone colic. The colic recurred in September and the jaundice increased in intensity. A dull aching pain in the region of the gall bladder had continued.

Examination revealed jaundice 4 serum bilirubin 7.9 milligrams and a coagulation time of 12 minutes. A diagnosis was made of biliary obstruction resulting from gall stones. At operation a subacutely inflamed gall bladder was found. It contained several stones two of which had perforated posteriorly into the liver forming two pockets communicating with the lumen of the gall bladder. A single stone approximately 1.5 centimeters in diameter was removed from the common duct. Stones were removed from the gall bladder and drainage instituted. Good recovery followed.

CASE 10 A man aged 50 had had intermittent attacks of painless jaundice with light colored stools between July 1923 and November 1925. Jaundice lasted for 2 or 3 weeks sometimes accompanied by fever then both would subside.

In July 1925 examination revealed a palpable gall bladder. The patient returned for observation in October 1924 with history of recurrence of the jaundice 3 weeks previously. The distended gall bladder was still palpable. In November 1925 he returned for examination stating that the last attack of jaundice had been present for 2 months with a loss of weight and fever varying from 99 to 102 degrees daily.

Examination revealed jaundice 2 temperature 100.5 degrees and a distended gall bladder. Be-

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OLD MASTERPIECES IN SURGERY

BY ALFRED BROWN MD FACS OMAHA NEBRASKA

CONSTANTINUS AFRICANUS

THE Arabian school held the foremost position in the medical world beginning with the eighth century. Continental Europe however though to a great extent quiescent had nevertheless not neglected either medical practice or teaching. There the direction of medical matters had passed over gradually from the lay physicians to the clergy. The monks assumed control of the teaching and carried it on in several institutions though at first more in a practical than a theoretical way. One of the first of these schools was the monastery of Monte Cassino. This had been founded by St. Benedict himself on the site of an old temple of Apollo to be used as a place where the sick could come for treatment and where St. Benedict might have the opportunity to work his remarkable cures. These cures were collected by one of the later abbots Desiderius (born 1027) and left by him as Four Books on the Miraculous Cures of St. Benedict. The quality of these cures might be questioned as the following incident shows. Henry II the Emperor of Bavaria was believed to be afflicted with the stone and came to Monte Cassino for a cure. Henry was a prominent monarch and St. Benedict apparently not wishing to cause him any undue inconvenience himself exerted his special power and removed the stone by lithotomy while he was asleep and then healed the wound at once. That this was done was proven by the fact that when the Emperor awoke the stone was in his hand. What more could be desired.

St. Benedict apparently wished this great power which he had to be his and his alone so as the founder of the monastery he forbade the teaching of medicine there. This prohibition was soon broken and its abbot Berthamus taught medicine both orally and by writing and Monte Cassino held its position as one of the great if not the greatest school in Italy until its reputation was eclipsed by the school of Salerno. During the ninth and tenth centuries this monastery held its position principally through the reputation gained through its association with the miracles of St. Benedict but as time went on something more was needed. Arabian medicine had gradually been improving. As yet its teachings had not crossed the Mediterranean into Europe but it was only a question of time when they would do so. The only unsettled point was the means by which this would be accomplished. The agency turned out to be a Carthaginian by name

Constantinus Africanus who was born some time during the first quarter of the eleventh century. After receiving his preliminary education where is not known he is supposed to have travelled many years throughout the east including Egypt and India to satisfy his thirst for medical knowledge. Finally he returned home. Whether he entered into practice or not is not established but shortly after his return he was accused of being a sorcerer and finally his life was threatened. One can imagine the feelings of this man who had spent years in the pursuit of knowledge possibly one of the most learned men in Carthage desirous of communicating the results of his labors to others met with accusations of this character which as human nature has not changed much were probably started by competitors mediocre or less than mediocre who were jealous of his attainments. One can see him sick at heart disgusted with the world in general in fear of his very life leaving his native land and fleeing to Italy. There he went to Salerno and joined the famous school teaching for a time. Still being in the world of men and apparently not satisfied he went from Salerno to Monte Cassino where he joined the order became a monk and sought peace and respite from worldly cares and disappointments in the monastery where he could study and write his books which served to bring the medicine and surgery of the orient to the western world.

From this sketch of what is known of his life one would not expect to find much that was original in his work. There may have been some work which he originated but as he does not give the sources from which he obtained his knowledge and makes no differentiation between his own work and that of others it is not possible for us to tell the difference. The work was published from his manuscripts some centuries later. It was translated by him from the oriental languages into Latin which Baas call barbarous. The work which I have had the privilege of examining consists of three parts. An Anatomy a Discourse on Elephantia and Medicaments Obtained from Animals. It was published at Basle by Henricus Petrus in August 1541 with works by other writers. Constantinus Africanus deserves recognition as the introducer of Arabian and Oriental medicine into Italy and as the means of initiating the subsequent supremacy of occidental surgery.

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THE USE OF RADIUM AND X-RAYS IN THE TREATMENT OF MALIGNANT DISEASES OF THE PARANASAL SINUSES¹

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ACCURACY in details is essential to proper application of radium and X-rays in the treatment of malignant diseases. The histological structure of the tumor, its size and shape, its relation to adjacent structures, particularly bone, and the presence or absence of infection must all be considered.

Probably no location in the body presents so many complicating factors as the paranasal sinuses. A wide range of tumor type is possible. The primary site of origin is often difficult and frequently impossible to determine. The invasion of adjacent soft parts, bone and cartilage and sinuses is hard to define. Interference with sinus drainage and infection gives rise to inflammatory tissue, which it is often impossible to differentiate clinically from tumor tissue.

The peculiar anatomy of the paranasal sinuses favors inflammatory processes. Just how much this has to do with the original cause of many of the growths is not known. Certainly it is an important factor. Inflammatory

processes alter the normal type of tumor growth and influence unfavorably the protective cellular reactions in surrounding normal tissues.

The complex embryology of the parts under discussion affords opportunity for tumor origin from many developmental anomalies. Hence a wide range of tumor type is met with.

Inasmuch as malignant growths of the maxillary antrum predominate, it is perhaps best for the purposes of the present discussion to center around this group. Whether most of the tumors referred to as antrum growths are primary or are secondary extensions from other sinuses or the nasal passages is frequently not understood. Inflammatory processes often mask the true picture. In our own experience these cases are usually so far advanced that the exact site of origin cannot be determined with any degree of accuracy.

Carcinoma is the predominating type of growth. A cylindrical cell carcinoma of adenocarcinomatous structure is most com-

expose the growth surgically. Still more frequently it is necessary to provide surgical drainage of the part or as in the antrum to remove the bulk of tumor tissue after radiation in order that more active infection in breaking down tumor tissue may be avoided. In other words we depend upon the physical agents to deal with the new growth directly and surgery to provide access and drainage. If radium is to be placed accurately the surgical exposure must be adequate. We are strongly in favor of large openings wherever possible. In exposing the antrum from below the floor and anterior wall should be removed. Such an opening gives free access and can be readily closed later by an obturator on a dental plate. If the floor of the orbit is invaded the eye should be sacrificed promptly and free access afforded in this way from above. We must remember that we are dealing with a lethal disease and that conservative measures may postpone treatment in some unsuspected and inaccessible area until it is too late.

In our experience X rays alone are not sufficient to control the growth in the paranasal sinuses except, perhaps in the cases of such unstable tumors as lymphosarcomata. They are however of very great assistance and this is particularly true since the advent of shorter wave length rays. We use X rays for practically all of our external radiation. Radium is of course the agent for direct application to or into the growth. The exact method depends upon the individual case but in principle it must be applied accurately and uniformly throughout the tumor and in sufficient amount to produce a maximum reaction consistent with the viability of surrounding normal tissues.

For this purpose we have for several years employed bare tubes of radium emanation very extensively. During the past year we have found it possible to prepare in our physical laboratories gold emanation tubes scarcely larger than the bare tubes or glass emanation tubes. This gives us all of the advantages of bare tubes minus the beta radiation. In other words it affords a means of burying filtered radium emanation obtaining a prolonged intense gamma radiation

and avoiding the severe inflammatory reaction due to beta rays.

We depend upon these small tubes of radium emanation buried uniformly throughout the growth for the major part of our radiation. We use them invariably in the antrum. In some other locations such as the turbinates it is possible and practical to insert metal needles containing either element or emanation. Since we have been unable to replace unfiltered by filtered capillary emanation tubes our tendency has been more and more toward discontinuing the use of needles. The small emanation tubes can be more accurately placed. Distribution is more uniform. They stay in place exceptionally well. Inasmuch as the dose is prolonged to at least 14 days of active radiation it can be very appreciably increased. There is ample reason to believe that the prolonged dose is more efficient than a comparable amount given over a shorter period. The trauma of introduction of capillary tubes is less than with needles.

Occasionally it is possible to place filtered tubes of larger size in rubber tubing either singly or in tandem and to pack them firmly in place at some point along the nasal passages.

A very efficient radiation of the postnasal space may be obtained by placing a bulb of emanation in a small hollow metal sphere as a filter this being wrapped with gauze to lend proper distance and drawn up into the postnasal space by means of a string previously passed backward through the nares. The type of bulb we usually employ for this is filtered by 0.4 millimeter gold platinum alloy and is about 8 millimeters in diameter.

These special applicators however must be devised to suit the individual case. The only standard form of radium application which we employ is the interstitial implantation of gold capillary emanation tubes.

The internal applications are almost always supplemented by external doses of X rays or filtered radium or both.

Radium applied within the sinuses produces an inflammatory reaction in the soft parts which increases the danger of infection. Hence adequate drainage is doubly indicated. It also has a devitalizing action on bone and

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CONGENITAL DISLOCATION OF THE HIP¹

By VITTORIO PUTTI M.D. BOLOGNA ITALY

A FEW months ago when I had the pleasure of receiving a visit from the Director General of the American College of Surgeons and I submitted to him a choice of subjects that I might present at the Clinical Congress he advised me to speak upon congenital dislocation of the hip. He selected a subject of great practical importance indeed but perhaps not the one most suited to rouse the interest of the general surgeon.

I accepted with pleasure however the advice of Dr. Franklin Martin because it gave me an opportunity to speak on a subject on which I feel competent to speak.

From the standpoint of my own experience I want briefly to lay before you the facts which I consider all important in dealing with congenital dislocation of the hip namely (1) its etiology and pathogenesis (2) its diagnosis and (3) its treatment.

ETIOLOGY

Concerning the etiology it is interesting to note that dislocation may be of hereditary and familial origin. From our statistics which up to the year 1924 record 1,879 cases with a total of 2,556 dislocations heredity plays a part in an average of 13 per cent. it is familial in an average of 10 per cent. The deformity is far more common in females. Our statistics reveal that 84.9 per cent of the cases were girls 15.1 per cent boys which would give us an average of eight girls to one boy. In 60

per cent of the cases the dislocations were single in 39 per cent the deformity was bilateral.

It is curious to note the geographical distribution of the disease. In Italy for example we find the deformity frequent in the northern provinces rare in the south and almost unknown in Sicily. I am not in possession of precise information regarding the United States but I am under the impression that the dislocation is far less common in North and South America than it is in Europe. It is certain that in the United States dislocation is more common among the white than among the colored people.

From our statistics it seems apparent that the hereditary factor cannot be overlooked. Notwithstanding the fact that the latest and most creditable theories of pathogenesis are inclined to point to the mechanical origin of the deformity we are forced to admit that this theory does not fully explain every case of dislocation. At the same time the hereditary origin leads us to suppose that in some cases the origin of the deformity must be traced beyond any mechanical cause that it is produced possibly from atypical morphological conditions which can be transmitted from one generation to the other. In the majority of cases however the mechanical origin is as yet the most plausible explanation and the one which appears to throw most light on the anatomical as well as on the clinical aspects of the disease.

¹Presented with moving picture film before Clinical Congress of American College of Surgeons Philadelphia, October 6, 1925.

primary growth is far advanced but with an otherwise operable neck we treat the neck as well as the primary mass in a purely palliative manner.

If the primary growth in the sinuses is of basal cell type no attention to the neck is necessary because the tumor does not metastasize. If the primary growth be a lymphosarcoma no surgery is indicated in the neck. It is a disease which extends widely and rapidly and is for any single local manifestation it can always be managed better by the physical agents than by surgery. As for the true sarcomata occasionally met with in the sinuses I am of the opinion that no surgery is indicated when metastases are present. They are too apt to be multiple and had best be treated by radiation.

In reviewing our clinical material relative to this subject I have been more forcibly impressed than ever with the advanced character of practically all of the cases. The majority is classed as carcinoma of the antrum with extensive bone destruction and the nasal passage partially or totally occluded by tumor tissue. In these it is impossible to determine in which sinus the growth was primary.

Of 100 cases treated between 1916 and the present time all but 28 patients were beyond the hope of anything except palliative measures. In 7 of these 28 cases the eye was removed and the antrum cleaned out from below. Of the total group 56 patients are known to be dead, 22 have been lost track of and are therefore assumed to be dead, 7 cases are too recent to classify and 15 present no clinical evidence of disease.

The duration of freedom from clinical evidence of disease in these 15 cases is as follows:

- 1 case 7 to 8 years
- 1 case 4 to 5 years
- 2 cases 3 to 4 years
- 5 cases 2 to 3 years
- 4 cases 1 to 2 years
- 2 cases 9 to 12 months

Of the 7 cases with removal of the eye in addition to operation through the mouth patients are well after 7 years, 1 is well after nearly 2 years, 1 was recently treated and 3 died.

In the group of 15 cases clinically free from disease 11 were of carcinoma and 4 of sarcoma.

We have seen only 1 case of primary carcinoma of the frontal sinus. This patient is now well 6 years after surgical exposure and radiation directly within the cavity.

One very unusual case of lymphosarcoma which had extended well into the antrum and orbit has remained well nearly 7 years following external radiation, removal of contents of orbit, antrum and ethmoid and intensive radiation within the cavity.

CONCLUSIONS

1. Surgical exploration of the paranasal sinuses and biopsy should be resorted to earlier and more frequently so that earlier diagnosis of new growths may be made.

2. With few exceptions the principles applying to surgical removal of cancer in general cannot be carried out in dealing with growths in the paranasal sinuses.

3. Radium and X rays are of value in treating this group of cases but except in palliative procedures must be used in conjunction with surgery.

4. Radium and X rays may be depended upon to eradicate the tumor tissue if applied accurately and uniformly throughout the growth in sufficient dosage.

5. Surgery must be employed to provide exposure for radium application and adequate drainage.

6. The anatomical relations of the parts are such that infection is a much greater menace here than in new growths in most other locations.

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DISCUSSION

DR C. E. FAHLER. The results obtained from radium and X rays in the treatment of paranasal

was practiced before Paci taught us the method of reduction through manipulation. But open intervention has not been altogether abandoned. Some surgeons still resort to it frequently. Our experience would lead us to be very conservative in using this method. It should be used only in those cases in which the reduction cannot be obtained by the ordinary method. And we cannot deny that this is quite often the case. When the reduction is attempted in patients of an advanced age and also in young patients in whom the primary displacements are very marked and there is a misshapen capsule or serious anteversion of the femoral neck, failure may follow the Paci treatment. Then and then only must the surgeon play his last card by attempting the open operation. We gather that this occurs on an average in 5 per cent of the cases.

The technique which I use in the open operation is as follows. A straight incision is made beginning about 2 inches above the anterosuperior spine of the ilium and carried along the crest down to and beyond the anterior superior spine. The muscles rectus femoris and tensor fascia femoris are separated and well retracted by blunt dissection. The capsule is exposed. An incision is made through the capsule. Special retractors are used to expose the head of the femur to full view. The capsule is examined for constrictions. The capsule is usually shaped like a funnel and this occasionally prevents reduction. A special instrument in the form of a dilator is inserted through this narrow constricting portion of the capsule and the capsule forcibly dilated. A special instrument in the form of a skid, similar to that of a Murphy skid, is introduced into the dilated portion of the capsule and into the normal acetabular cavity. The knee is grasped and the femoral head abducted and inverted over the sliding instrument into the acetabular cavity. The wound is closed in the usual manner without drainage. Dressings are applied and the thigh is placed in right angle abduction and slight internal rotation similar to that used in the closed method.

I have so far discussed the treatment of dislocation in patients who are within the age limit

which experience has taught us to be the best for obtaining favorable results that is, for bilateral dislocation a maximum age of 4 years and for single dislocations a maximum of 7 years.

What shall the surgeon do when he is confronted with a case in which the age limit is passed? It is hardly possible to give a definite answer to this question. There are cases in which the patient's age excludes the possibility of obtaining a perfect functional and anatomic recovery but in which intervention cannot be avoided. In other cases the surgeon must advise against intervention. The surgeon must judge not on the actual state of the dislocation but must be led in advising to consider the future of the patient and the complications which may eventually arise from the existing deformity. There is a danger which usually becomes manifest only after the fifteenth or the twentieth year that is traumatic arthritis which is the cause of pain, rigidity, stiffness and consequently functional impediment. If these symptoms appear early that is before the fifteenth year of age they are sufficient cause for operation. Even if ankylosis results, this is sometimes preferable to a painful dislocation.

Once intervention has been decided on, one has the choice between the bloodless method, the open reduction and the other palliative operations such as the anterior transposition, subtrochanteric osteotomy or the bifurcation of Lorenz. In suitable cases we have succeeded in obtaining reductions by manipulation even in patients of 6 and 21 years of age. Open intervention must always be considered as a serious operation to be resorted to only in certain well defined cases.

In four cases I performed a real arthroplasty of the hip modeling in a suitable manner the femoral epiphysis deepening with an electric drill the cotyloid cavity and interposing a flap of fascia lata.

Among the palliative methods which can be suitably employed we have the anterior transposition and the so called bifurcation operation of Lorenz that is an intervention destined to place a stump of the diaphysis instead of the femoral head into the acetabular cavity.

SECONDARY OPERATIONS ON THE COMMON BILE DUCT

BY WALTERMAN WALTERS M.D. ROCHESTER MINNESOTA
D. IS 15 gery May Clin

DURING the last few years noteworthy advances have been made in the treatment of complicated disturbances of the biliary tract. These have consisted of studies of the blood and clinical methods of examinations that have indexed the patient's condition so that the most opportune time for operation and the extent of safe operative procedures can be accurately determined. Rehabilitation of the patient with obstructive jaundice by means of intravenous injections of calcium chloride and glucose solutions before and after operation has been of value in this respect.

The van den Bergh test enables one to determine the quantity of bile pigment circulating in the blood serum from day to day, the surgical significance of which is in the opportunity thus afforded of delaying operative measures when the bile retention is increasing because of the risk of postoperative bleeding or hepatic dysfunction.

The fact that removal of the dog's liver, as shown by Mann, is accompanied among other changes by such a decrease in the amount of blood sugar that tetanic convulsions ensue, and the fact that the convulsions cease immediately after the intravenous injection of glucose solution have led to the use of intravenous injections of the glucose solution in many patients with disturbance of the liver.

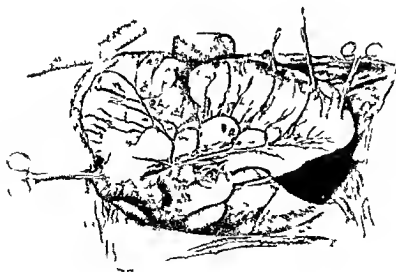
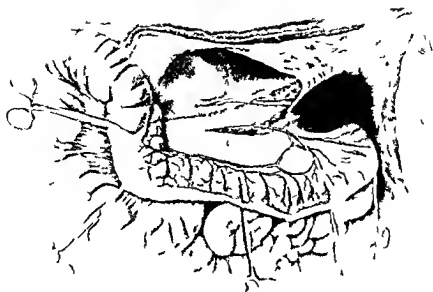
In 1909 Ahel and Rowntree demonstrated that halogenated phenolphthalein (phenol tetrachlorophthalein) was excreted totally in the bile. Based on this fact Graham, using the sodium salt of other halogenated phenolphthaleins (tetrahydrophenolphthalein and tetraiodophenolphthalein) has shown that the bile in the gall bladder becomes opaque to the roentgen ray after their oral and intravenous administration. The use of this method of cholecystography and the proper interpretation of findings have greatly increased the accuracy of the roentgenographic diagnosis of gall bladder dysfunction. The practical application of these principles has

made it possible to extend operability to include many patients with complicated disease of the biliary tract who in earlier years would have been denied operation because of the grave risk entailed.

SECONDARY OPERATIONS ON THE COMMON BILE DUCT

From the standpoint of diagnosis and treatment of disease of the biliary tract in involvement of the common bile duct often causes unsuspected postoperative complications. In some instances therefore a satisfactory operation may be performed on the gall bladder and the disease of the common bile duct may be overlooked either as a result of failure to recognize the cardinal signs and symptoms of disease of the duct or of failure to explore it properly. Yet the technique employed in operating on the common and hepatic bile ducts is not difficult after the common duct has been identified. Such cases of common duct disease are not infrequently overlooked at operation. For instance during the last 6 months I have performed secondary operations for disease of the common bile duct in 6 cases in which symptoms prior to the first operation were characteristic of involvement of the common bile duct. A summary of these is appended. Although careful attention had been given at the previous operations to the treatment of the diseased gall bladder, the existence of a stone in the common duct had not been discovered. In Cases 1 and 2 the stones were large enough to be felt on palpation of the duct and accessible enough to be removed by simply cutting down on them (Fig. 1).

Included with the present series of cases in which secondary operations on the biliary tract were necessary are short abstracts of 7 other cases of common duct involvement in which I operated during the same period. Each case is illustrative of a different group in which obstructive jaundice is a complicating factor of biliary tract disease.



relieved. But if the jaundice is decreasing the patient withstands the operation almost as well as though it had not existed.

PAINLESS JAUNDICE

In a few cases (more often in men than in women) painless jaundice may exist as a result of a single stone in the common duct although it is usually the result of pancreatic obstruction due either to malignant or inflammatory changes compressing the pancreatic portion of the common bile duct or to carcinoma of the duct itself (Case 10). Should the jaundice be the result of a common duct stone a period of observation prior to operation may allow the jaundice to decrease and also permit the development of additional symptoms to clarify the diagnosis. This principle is well illustrated in Case 7 in which there was probably an obstructing stone in the common bile duct with no symptoms other than the jaundice. While the patient was under observation, he developed his first attack of gall stone colic and undoubtedly passed the common duct stone for subsequently the jaundice began to diminish. A gangrenous gall bladder and impacted gall stone in the cystic duct and a dilated thickened common bile duct were found at operation (Fig 7). In Case 13 pain-

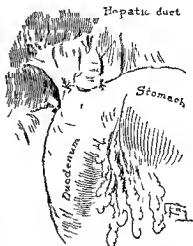


Fig 4 (Case 5) Hepaticoduodenostomy over a tube

less jaundice had existed for months before an attack of gall stone colic occurred, and at operation a mass of soft putty like stony material impacted in the ampulla and a gall bladder filled with stones were removed. Stones formed in the common duct, after the gall bladder has been removed are usually soft granular, or putty like, and contain little or no cholesterol.

PAIN RESULTING FROM OBSTRUCTION OF THE BILIARY TRACT

The persistence of gall stone colic after the removal of the gall bladder, is suggestive of stones in the common or hepatic ducts. In Case 12 cholecystectomy was performed for empyema of the gall bladder in September, 1919. At that time the common duct was opened and explored because of jaundice but no obstruction or stone was encountered. An enlarged spleen was noted. In August 1925 the gall stone colics returned with an increase in the jaundice. A mass of putty like material approximately 1.5 centimeters in diameter was removed from the lower end of the common duct and splenectomy performed at the same time for the complicating hemolytic jaundice. The patient made a good recovery and the jaundice disappeared.

In some instances a postoperative incomplete stricture of the common bile duct will cause attacks of upper abdominal colic simulating that which results from an obstructing

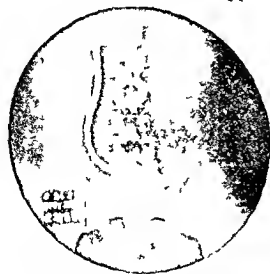
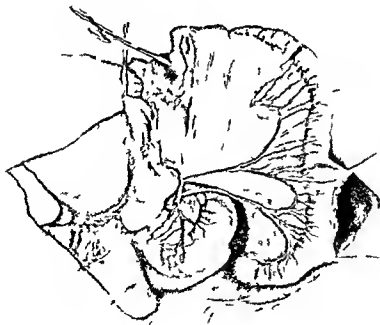
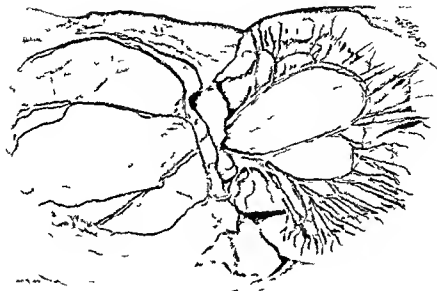


Fig 3 (Case 4) Roentgenogram 3 weeks after operation showing catheter in place



they may sometimes be brought down by inserting the little finger into the proximal end of the bile duct through the exploratory opening the finger being used as a piston to suck the stones into view. Courvoisier called attention to the ease of removing a stone in the middle portion of the common bile duct by grasping the duct and stone in the left hand and cutting directly down on the stone as one would on a darning ball in a stocking. Bartlett's common duct retractor is often useful. Stones in the lower portion of the common duct may be worked by the thumb and forefinger of the left hand into the upper portion of the duct and removed through the incision. If such stones are impacted a pair of Desjardin forceps introduced into the duct makes it possible in most cases to grasp and remove the stone easily through the exploratory incision in the duct.

Obstruction in the lower end of the common bile duct may be due either to a stone or to abnormal changes in the head of the pancreas. If a probe or scoop cannot be passed through the lower end of the common bile duct into the duodenum the reason for this failure must be ascertained even if it necessitates making a transduodenal exposure of the ampulla (9, 17). This procedure was used to advantage in the removal of a coincidental duodenal ulcer (Case 4, Figs. 2 and 3) and greatly assisted in removing all of the stony material impacted in the ampulla in Case 13. The importance of determining the presence of all obstruction in the biliary tract and removing it if possible cannot be too strongly emphasized. It has been found that in 50 per cent of patients who die following operation for common duct stone a stone has been overlooked in the biliary tract.

Sometimes a small stone at or near the papilla will be pushed ahead of the scoop into the duodenum freeing the duct. The scoop for clearing the duct must be used without too much force as otherwise the stone may slip to one side into a traumatic diverticulum permitting the scoop to slip by the stone into the duodenum and thus lead to the erroneous belief that the duct is free from stones. There is no probe like the finger and when the duct is sufficiently dilated to admit the finger the

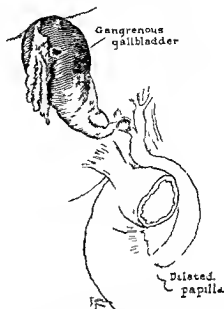


Fig. 7 (Case 7) Stone in cystic duct. Note gangrenous gallbladder enlarged common duct and dilated papilla.

discovery of a stone is facilitated greatly. If the head of the pancreas is enlarged, it may be very difficult to be certain that stones are not overlooked.

STRICTURES OF THE COMMON BILE DUCT

Most strictures of the common bile duct are the result of injury to the duct or of infection following previous operations (Case 12). It is true that congenital stricture of the common duct is a possibility although it is extremely rare and also that stricture may occur as a result of typhoidal ulceration, syphilis or an extensive duodenal ulcer. If, in removing a gall bladder one is always careful to expose and isolate the cystic duct at its union with the gall bladder there is little, if any chance of injuring the common or hepatic ducts. Similarly the same attention to the cystic artery is advisable for the retraction of this artery during an operation on the gall bladder and the hasty attempt to catch it with sharp toothed forceps is often the cause of injury to the biliary ducts.

Not only is the surgical treatment of stricture of the common duct tedious and difficult but the end results in many instances are not satisfactory. In the repair of a stricture of



Fig. 1. Mobilization of the splenic pancreas (body and tail)

THE APPLICATION OF A KNOWLEDGE OF THE SHEETS OF COALESCENCE TO SURGERY

Through a knowledge of these sheets the various fixed sections of the alimentary tract may be made movable and the operative technique in abdominal surgery thus simplified. After the fixed portions of the gut are freed they may be brought to the surface of the abdomen; this facilitates the execution of the most difficult details of section and anastomosis, and at the same time diminishes considerably the danger of contamination of the cavity.

Mobilization of the duodenum greatly simplifies investigations for constrictions at the retropancreatic choledochus and the gastro-duodenostomy of Villar Finney or any gastric anastomosis, especially that of the end to end type after pylorectomy.

In operations for the reduction of fixed hernia of the ileo cæco colonic segment or of the sigmoid colon the preliminary step is mobilization of the gut.

When the cæcum has secondarily become fixed and the appendix is retrocecal to expose it it is necessary to free the cæcum and the lower portion of the ascending colon.

Renal and other retroperitoneal tumor may easily be operated on by the abdominal route if the colon is first made mobile (Fig. 2 and 3).

Commonly the spleen remains mobile in the left wall of the omental bursa, its mobility being limited by the lienorenal and splenopancreatic ligaments posteriorly (Fig. 3) and the gastrosplenic ligament anteriorly. It sometimes occurs that the fusion of the posterior mesogastrium with the parietal peritoneum of the posterior wall extends so far to the left that the spleen is partially fixed. Donald Balfour of Rochester for several years has taught that in these cases the operative technique of splenectomies may be simplified by mobilization of the fixed portion of the spleen.

Since 1911 I have mobilized the tail of the pancreas and spleen in these operations.

Excellent methods have been described for mobilization of the head of the pancreas in the execution of duodenoccephalic pancreaticotomies. These do not apply to operations on the body of the pancreas which have been effected without any specialized method. As has been pointed out it is possible to reach the

malignant condition at the head of the pancreas. Deaver believes that the symptoms of pancreatitis may simulate those most typical of a common duct stone. Helly, in a study of the relation of the pancreatic portion of the common bile duct to the pancreas, showed that in 25 of 40 cases the duct passed through the substance of the gland while in the remaining 15 cases it was not entirely surrounded by pancreatic tissue. We may be assured then that if pancreatitis is associated more than 60 per cent of patients will be jaundiced.

Moynihan has called attention to the fact that when jaundice is the result of pancreatic malignancy, rigor and intermittent fever are usually absent. No variation occurs in the jaundice and often there is intense steady pain in the back. In many cases it is very difficult to distinguish between these two conditions even at operation, and for this reason when ever the general condition of the patient permits an anastomosis is made between the gall bladder and the gastro intestinal tract. Such was the condition in Case 10. A history of intermittent fever and jaundice for almost 2 years was sufficient reason after the demonstration of a tumor at the head of the pancreas for cholecystogastrostomy. The patient withstood the operation with little reaction and was dismissed from observation 4 weeks later free from fever and jaundice and gaining in weight. The pancreatic tumor may have been the result of inflammatory pancreatitis or secondary to a slow growing pancreatic carcinoma. The operation will benefit the patient in either event by relieving the obstruction in the biliary tract and adding considerable comfort to his existence. Should the obstruction be the result of pancreatitis the patient will recover and remain well.

POSTOPERATIVE TREATMENT

Usually patients convalesce uneventfully when operated on after preliminary preparation consisting of intravenous injections of 5 cubic centimeters of 10 per cent calcium chloride solution adequate fluids and abundant carbohydrates especially glucose. Should the patient fail to convalesce satisfactorily the blood is studied. Should the acid alkali balance be disturbed intravenous injections

of sodium bicarbonate are given to control acidosis or sodium chloride to control alkalosis. These are usually added to a solution of 10 per cent glucose. The stomach tube is used if there is gastric retention which is usually evidenced by hiccups or persistent vomiting of small amounts. Should bleeding occur following the operation the intravenous injections of calcium chloride are resumed and a blood transfusion performed if necessary.

REPORT OF CASES

CASE 1 A woman aged 45 had had gall stone colics and was jaundiced in November 1923. In May 1924 cholecystostomy was performed elsewhere but no stones were found in the gall bladder. The biliary fistula closed in 6 weeks but the jaundice did not diminish. The patient continued having pain in the right upper quadrant and also between the shoulder blades. At times she had had chills and fever.

Examination revealed jaundice 3 and serum bilirubin 8.9 milligrams for each 100 cubic centimeters. A diagnosis was made of stone in the common duct. At operation (choledochostomy) a stone 3 by 2 centimeters was found in the common duct just above the papilla and removed. The patient made a good recovery (Fig. 1).

CASE 2 A woman aged 61 had had cholecystostomy for gall stones, appendectomy in September 1923 elsewhere and cholecystectomy for gall stones in July 1924 elsewhere. She continued to have attacks of gall stone colic with jaundice.

Examination revealed jaundice 2 and serum bilirubin 3 milligrams. A diagnosis of stone in the common duct was made and at operation a stone 1 centimeter in diameter was found in the lower end of the common duct and removed. The patient recovered uneventfully.

CASE 3 A woman aged 59 had had two previous operations elsewhere on the gall bladder, cholecystostomy in 1917 and drainage of an abscess in 1921. Since the fall of 1924 she had had five attacks of pain in the upper right quadrant of the abdomen accompanied by chilliness and cold sweats. Jaundice occasionally followed pain when the stools were light in color.

Examination disclosed tenderness in the epigastrium but no jaundice. The diagnosis was recurring cholecystitis and probable ball valve stone in the common duct. Choledochostomy and cholecystectomy were performed and the ball valve stone was removed from the common duct. The stone was about 8 millimeters in diameter and situated in the ampulla at the lower end of the common duct. Chronic cholecystitis was confirmed at operation but no stones were found in the gall bladder. The patient recovered and has been free from symptoms since.

In respect to the former, that is, to the selection of the most suitable, highly potential protein available antidiphtheritic serum as it is now prepared offers perhaps the best form of foreign protein for administration to the human. Because milk varies in its potential and toxic action, numerous commercial preparations are now undergoing experimentation. Normal horse serum, 'Aolan', 'yatsencasein' 'Ciba' (cibalbunin, aseptic solution of egg albumin) albumose, proteose, non specific vaccines etc. have not as yet been shown to possess with any certainty a more reactive and potential effect than has anti diphtheritic serum 'Aolan' has been heralded as a preferable form because it does not produce a systemic reaction. This is strange since a positive systemic reaction that is to say a moderate rise in temperature et cetera is necessary in order to establish the pre anaphylactic stage of hypersensitivity and thereby increase resistance which is believed to be the therapeutic effect. Furthermore the dosage and reaction of other preparations are uncertain. The dosage of the serum is certainly more definite and its anaphylactic effects are more clearly understood. Banzhaf's method of preparing the serum by isolating the antitoxin globulins permits the use of a concentrated serum which lessens the incidence of serum sickness and facilitates the administration of large doses. According to Park this method gives a concentration of about six times the original potency. Daner, Frogier and others claim to have shown that it is ten times more potent than normal horse serum which may be due not only to its high concentration and method of preparation but also perhaps to the constituents attributed to the diphtheria bacillus or toxin.

Moreover the theory as to the properties and structure of antibodies in immunity lends striking evidence (Vaughan, Kraus, Ichikawa, Ludke) that there may be a direct antagonist a special antigen or protein (globulin) in the serum more active than a mere animal protein (milk, egg albumin), the method of concentration of the serum adding to the concentration of the antibody elements in the serum. If there is any virtue to be had in the non specific diphtheritic elements (colloids?)

in the serum there is a decided advantage and preference in antidiphtheritic serum over other forms of proteins employed in this therapy. Furthermore, the facility of obtaining and administering suitable doses of anti diphtheritic serum is a distinct advantage not to be overlooked.

As for anaphylaxis a concentrated serum is not so likely to produce serum sickness as whole serum since a smaller quantity of it is injected. The history of previous anaphylactic conditions previous diphtheria status lymphaticus asthma or hayfever like attacks in persons proved susceptible in a stable and horse environment are well established as probable contra indications to serum injections. I have not observed serious anaphylactic effects in any case (now 170 cases treated) and doses have varied from 1 000 to 5 000 units a total in one case of 12 000 units (given in 3 000 and 2 000 unit doses). These doses are pitifully small when contrasted with those frequently given even for prophylactic purposes in diphtheria (5 000 to 10 000 units) not to mention those employed for the full therapeutic effect (10 000 to 20 000 units). Verhoff recently reports the injection of 20 cubic centimeters (about 16 000 units) every day for a period of about a month in a case of sympathetic ophthalmia in which case he claims a cure. My own experience however has taught me some respect for the highly potent effect of anti diphtheritic serum and also that small doses of 3 to 4 cubic centimeters (2 400 to 3 200 units) are harmless and yet are sufficient to produce moderate systemic reaction just short of anaphylaxis. It is well known that infections probably represent either an increase of pathogenic power on the part of certain micro organisms or a disturbance of the defensive mechanism of the host whereby the normal relations are disturbed and micro-organisms that normally are harmless become infective and disease producing. The severe general reactions observed in acute anaphylaxis and after the first intravenous injection of a foreign protein differ both theoretically and in their manifestations yet in a sense the results are not dissimilar. In anaphylaxis a sublethal dose given to a sensitized animal leaves it immune

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tory result, which otherwise may have been a calamity is deserving of our knowledge of these facts

Now with these theoretical and clinical phases of the subject in mind the problem as it presents itself at this time is first to determine the relative value of injections of anti diphtheritic serum and normal horse serum concentrated in the same manner and containing the same nitrogen content and thereby to elucidate the question of the immune body as a possible potent influence in the therapeutic reaction (para specific effect?) second, to determine the relative value of different forms of protein (animal vegetable and bacterial), especially as to milk aolan bemp extract typhoid vaccine and tuberculin (TO) as they affect staphylococcus and pneumococcus infection of the refractive media of the eye third to study the relative value of different methods of injection that is intra dermal subdermal intramuscular, and intravenous fourth to demonstrate a maximum and minimum dosage in relation to the time and character of the infection, and fifth to determine the effect of previously injected immunizing doses for prophylactic purposes

Now in so far as animal experimentation is concerned only a small part of the whole problem can be dealt with at one time and yet each experiment carries with it many factors entirely separate in importance but each dovetailing finally into a more complete analysis and conclusion

With this in mind I have during the past 2 years confined my study to the inoculation of the true cornea with the staphylococcus pyogenes aureus observing the effects of intramuscular injections of antiphtheritic serum as against concentrated horse serum milk and typhoid vaccine But to pursue such an apparently simple outline of experimentation, one finds very soon that many unexpected difficulties arise each of which must be worked out separately—problems within problems for example the method of inoculation standardizing the virulence of the micro organism the correct dilution of the fixed virus similarity of the animal dosage of the protein injected and many others of less importance

In this series of 26 experiments it was necessary to inoculate 94 corneas The same eye or the same animal was not employed when any effect from previous inoculation and possible immunity thereby could interfere in any sense with the correct interpretation of the results The rabbits used in each experiment were about the same within reasonable limits as to size and weight The same number of rabbits were used for controls as were used for injection Usually 6 were inoculated in each experiment 2 being injected with antiphtheritic serum 2 with typhoid vaccine (or milk or concentrated horse serum) and 2 used as controls

In preparing the micro-organism for inoculation the culture was always grown on artificial media for 4 hours before inoculation At first the cultures were made from infections of different parts of the body but in the later experiments it was necessary to standardize the virulence of the micro organism For this purpose a strain from the eye was cultivated and carried along *passu* with a strain from another location for the purpose of studying relative virulence of each strain for corneal sub tance at the same time both strains were being brought to their maximum virulence for the rabbit's cornea through "passage"

The method of inoculation was as follows The eye was cocaineized the lids were retracted with the small rabbit speculum the superior rectus was grasped with fixation forceps a small sterile hypodermic needle was introduced into the corneal sub tance at a point 2 millimeters from the upper limbus carried horizontally by a twisting motion well into the deep stroma and extended for a distance of 3 millimeters to the center of the cornea After turning the needle three times completely around in this punctured wound in order to form a channel of the same size in each instance it was withdrawn dipped into staphylococcus emulsion and immediately reintroduced into the channel or puncture wound as before It was now withdrawn and the needle at once plunged into agar media as a control In the later experiments instead of reintroducing the needle after dipping it into staphylococcus emulsion 100 of a

cause of the intermittent character of the jaundice and fever and the long period of time elapsing since its onset exploration of the biliary tract and pancreas was advised. A mass was found at the head of the pancreas producing distention of the biliary tract. An anastomosis was made between the gall bladder and the stomach (cholecystogastrostomy). The patient withstood the operation satisfactorily and a month later his jaundice had disappeared he had regained his appetite and was regaining his strength. It was difficult to tell from the consistency and contour of the mass at the head of the pancreas whether it was due to pancreatitis or malignancy.

CASE 11. A Syrian woman aged 40 had had a history of pain in the area of the gall bladder for 10 years. Cholecystectomy with removal of four stones was performed in August 1924 elsewhere. Four months later the dull steady pain again appeared with attacks of colic sometimes accompanied by jaundice. The pain was under the right costal margin and at times extended around the ribs to the back.

At the time of examination the attacks occurred every 2 or 3 days at times with nausea and vomiting. The van den Bergh test for bilirubin in the blood showed 0.7 milligrams in 100 cubic centimeters. Exploration of the common and hepatic ducts and pancreas was performed December 17 1925. There were slight adhesions and the common duct was enlarged even more than it should be after the removal of the gall bladder. It was difficult to pass a scoop through the common duct at first but finally a large coop was passed. The adhesions around the duct were separated and a small drain was inserted in the hepatic duct. The patient left the hospital in good condition.

CASE 12. A man aged 51 had had a cholecystectomy and an exploratory choledochotomy for subacute empyema of the gall bladder with gall stones in September 1919. He was slightly jaundiced but no obstruction was found in the common bile duct. It was noted that the spleen was twice its normal size and there was some cirrhosis of the liver. The tinge of jaundice continued after the first operation and his general health was only fair. In the first week of August 1925 he had another attack of gall stone colic severe enough to require morphine with a slight increase in the jaundice and with clay colored stools.

On examination there was slight tenderness over the right upper quadrant and 0.5 milligram of serum bilirubin in 100 cubic centimeters of blood. The history of familial jaundice and the presence of a tinge of jaundice practically since birth with secondary anemia and reduced erythrocytes led us to believe that a hemolytic jaundice was associated with biliary tract disease. At operation a large common duct stone was found and a mass of putty-like material was removed from the lower end of the common bile duct. Because of the enlargement in the spleen and the history suggestive of hemolytic

jaundice it was thought advisable to perform splenectomy. The patient recovered satisfactorily from the operation the jaundice disappeared and he was dismissed in excellent condition.

CASE 13. A woman aged 52 complained of general weakness with loss of strength followed by painless jaundice. A month later a sharp attack of pain occurred in the right upper quadrant radiating to the epigastrium and around to the back. The pain was severe enough to require morphine. Since then a dull aching had persisted in the right upper quadrant. Occasionally she had had diarrhoea and light colored stools with bloating and gas eructation after meals. She had lost 25 pounds in the last 6 months.

On examination the patient was found to be jaundiced and tender in the right upper quadrant of the abdomen. A diagnosis of common duct obstruction was made with a 50 per cent chance of a malignancy. At operation a distended gall bladder and common duct were found. Impacted in the ampulla was a mass of putty like stony material approximately 1.5 centimeters in diameter. It was so firmly fixed that a trans duodenal exposure at the papilla and an opening in the common duct were necessary in order to remove all the fragments of stone. The gall bladder was filled with stones and thick caramel colored bile. The gall bladder was removed and a catheter placed in the common duct. The opening in the duodenum was sutured. The pancreas was apparently normal and there were no other stones in the hepatic duct. The patient's convalescence was satisfactory until the ninth day when following the removal of a gauze drain a hæmorrhage occurred from the drainage tract. This ceased during the next 12 hours. Three days after the first hæmorrhage a second occurred which necessitated blood transfusion and packing of the operative area with gauze.

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thought that the character of the corneal lesion depended solely upon the dilution. As shown in experiments 11 to 19 it was found that the dilution necessary to produce a definite corneal lesion was dependent upon the virulence of the micro organism.

An attempt was made to obtain a virulent strain by passage of a certain strain through the anterior chamber of the eye experiments 7 and 14. But this was found to be unreliable because one strain proved to be more virulent than the other and one of them of such low virulence that, as shown in experiments 12, 14, 17 and 18, a very small lesion or even no lesion at all developed as a result of inoculation although a dilution of 1 to 10,000 was used.

Finally, an attempt was made to standardize the virulence of two different strains of staphylococci by passing each strain successively through the cornea of three rabbits. This led to the interesting observation that the staphylococcus from acute conjunctivitis was in every instance more virulent than the strain cultivated from an infected throat as shown in experiments 20 to 26. In experiments 25 and 26 the corneal lesion from the throat culture was not so advanced as that from the eye culture although the dilution of the throat culture (1 to 1,000) was five times as strong as the dilution of the eye culture (1 to 5,000). This is certainly definite evidence demonstrated in every instance 30 eyes being inoculated in experiments 20 to 26 inclusive all 15 eyes inoculated from the eye culture showing more marked corneal lesions than the 15 eyes inoculated from the throat culture. Furthermore this observation at once raises the question whether or not any staphylococcus from a corneal ulcer or acute conjunctivitis has greater virulence or specific effect for the cornea of the rabbit and whether or not through 'passage' the virulence of staphylococci from other parts of the body can be raised to a virulence similar to that shown by a strain originally from the eye.

CONCLUSIONS

1. Such an investigation as this is dependent for its accuracy primarily upon the method of inoculation the determination of

a fixed virus through "passage" and the suitable dilution of this virus.

2. The method of injection the size of the dose and the relative value of different forms of protein should be worked out with some degree of certainty from the outline of procedure finally demonstrated in these experiments.

3. These experiments also argue without variation in favor of that very interesting and important question of virulence of different strains of staphylococci for corneal substance as evidenced by the unmistakably greater virulence of the staphylococci cultivated from the eye as compared with those cultivated from the throat. Whether this is entirely a specific effect or a mere variation in ordinary virulence remains to be proved.

4. In almost every experiment in which any difference could be noted, the animal which received the protein injection showed the least corneal reaction to the infecting micro organism. No important difference however between the effect of antidyphtheritic serum concentrated horse serum and typhoid vaccine upon the infection could be observed in any of the experiments. Sterile milk although tried in only two experiments (1 and 2) that is 12 rabbits showed no effect whatever and the corneal lesions were similar in every way to those of the control animals.

From the clinical point of view may I conclude that I do not wish to be regarded as overenthusiastic about this subject but I feel bold enough to challenge you to administer antidyphtheritic serum in your next 5 cases of penetrating wound with infection or of hypopyon keratitis before the infection has become overwhelming and then draw your own conclusions.

Furthermore I wish to affirm that colloid chemistry in medicine has come to stay, and the sooner systematic and serious research of the varieties and forms of protein (animal, vegetable and bacterial) and their particular reactions to infection is made the more valuable will become our therapeutic strength to combat disease.

On the other hand I wish to state with some seriousness that we should not draw con-

mon in all of the sinuses. It is rapid in growth, bulky, and bleeds easily. It invades bone readily or may erode it from pressure. Consequently with this type of tumor in both antrum and nasal passage it is impossible to determine the primary origin. Squamous cell carcinoma usually represents secondary invasion of the antrum but may arise there primarily from lining membrane cells altered or flattened by some previous inflammatory processes.

Certain basal cell tumors arise in the antrum: adenoid cystic epithelioma, cylindroma, and endothelioma. These are usually of dental origin and are easily identified by their relation to the teeth. They are altogether less malignant and of slower growth than other types but are not usually recognized until late.

Most of the so called sarcomata of the antrum are in reality round cell carcinomata of atypical structure, the result of chronic inflammatory changes in the lining mucous membrane.

True sarcoma of the antrum and nares is usually angiosarcoma or myosarcoma. Osteogenic sarcomata are rare but are easily recognized either radiographically or histologically.

Mixed spindle and round cell sarcomata of the turbinates, so called fibrosarcomata, are not uncommon. Chondromyosarcomata of the vault of the pharynx are met with occasionally in children.

Lymphosarcoma may appear at almost any point in the paranasal sinuses but is practically always only a part of a more general disease. It is not improbable, however, that this disease frequently has its origin in the lymphoid tissue of the postnasal space. Its invasion of the sinuses therefore is from behind forward. Its rate of growth is so rapid that the exact origin can only be guessed at.

Essentially benign tumors do not come within the scope of this paper. Mention is made simply to say that they are purely surgical problems. If radium is used its caustic action must usually be employed and this element makes it too dangerous to be used in benign tumors.

The symptoms and clinical course of malignant diseases of the paranasal sinuses are too well known to merit discussion here except for emphasis on one point. (I realize that I am dealing with the problem from the standpoint of one treating malignant diseases rather than as a nasal specialist. Yet I do not believe much time elapses between the making of a diagnosis by the nasal specialist and reference to us for treatment.) The cases are almost invariably far advanced. It does seem that they are considered inflammatory for too long a period and that biopsy or earlier surgical exploration of more sinuses would result in a saving of many of these cases.

Mixed infection with the resulting inflammatory processes not only complicates diagnosis but makes definition of the tumor bearing area uncertain. It adds to the surgical risk. It aggravates tumor growth. Osteomyelitis almost invariably accompanies tumor invasion of bone. It interferes with the reaction of the normal tissues about the growth to the physical agents. More of these cases succumb to fatal infection than to the natural progress of the disease.

A review of the literature reveals rather few favorable results in the treatment of adult types of malignant growths in the sinuses. This is not surprising when we realize that surgical principles as applied elsewhere can rarely be applied in the treatment of accessory sinus growths except perhaps in excision of the upper jaw for early growths in the maxillary antrum without bone invasion.

During the past few years radium and X-rays have proven of value in dealing with this group of cases. These physical agents however have their drawbacks and shortcomings just as surgery has in such a complicated group of diseases.

In our experience a combination of surgery, radium and X-rays offers most. We believe that radium and X-rays are capable of eradicating the tumor tissue if the radiation is delivered uniformly throughout the growth and in sufficient amount depending upon its exact type. In order that this may be accomplished it is frequently necessary to

thought that the character of the corneal lesion depended solely upon the dilution. As shown in experiments 11 to 19 it was found that the dilution necessary to produce a definite corneal lesion was dependent upon the virulence of the micro organism.

An attempt was made to obtain a virulent strain by passage of a certain strain through the anterior chamber of the eye. experiments 7 and 14. But this was found to be unreliable because one strain proved to be more virulent than the other, and one of them of such low virulence that as shown in experiments 12, 14, 17, and 18 a very small lesion or even no lesion at all developed as a result of inoculation although a dilution of 1:10,000 was used.

Finally an attempt was made to standardize the virulence of two different strains of staphylococci by passing each strain successively through the cornea of three rabbits. This led to the interesting observation that the staphylococcus from acute conjunctivitis was in every instance more virulent than the strain cultivated from an infected throat as shown in experiments 20 to 26. In experiments 25 and 26 the corneal lesion from the throat culture was not so advanced as that from the eye culture although the dilution of the throat culture (1:1,000) was five times as strong as the dilution of the eye culture (1:5,000). This is certainly definite evidence demonstrated in every instance. 30 eyes being inoculated in experiments 20 to 26 inclusive all 15 eyes inoculated from the eye culture showing more marked corneal lesions than the 15 eyes inoculated from the throat culture. Furthermore this observation at once raises the question whether or not any staphylococcus from a corneal ulcer or acute conjunctivitis has greater virulence or specific effect for the cornea of the rabbit and whether or not through 'passage' the virulence of staphylococci from other parts of the body can be raised to a virulence similar to that shown by a strain originally from the eye.

CONCLUSIONS

1. Such an investigation as this is dependent for its accuracy primarily upon the method of inoculation the determination of

a fixed virus through "passage" and the suitable dilution of this virus.

2. The method of injection the size of the dose and the relative value of different forms of protein should be worked out with some degree of certainty from the outline of procedure finally demonstrated in these experiments.

3. These experiments also argue without variation in favor of that very interesting and important question of virulence of different strains of staphylococci for corneal substance as evidenced by the unmistakably greater virulence of the staphylococci cultivated from the eye as compared with those cultivated from the throat. Whether this is entirely a specific effect or a mere variation in ordinary virulence remains to be proved.

4. In almost every experiment in which any difference could be noted the animal which received the protein injection showed the least corneal reaction to the infecting micro organism. No important difference however between the effect of anti diphtheritic serum concentrated horse serum and typhoid vaccine upon the infection could be observed in any of the experiments. Sterile milk although tried in only two experiments (1 and 2) that is 12 rabbits showed no effect whatever and the corneal lesions were similar in every way to those of the control animals.

From the clinical point of view may I conclude that I do not wish to be regarded as overenthusiastic about this subject but I feel bold enough to challenge you to administer antidiphtheritic serum in your next 5 cases of penetrating wound with infection or of hypopyon keratitis before the infection has become overwhelming and then draw your own conclusions.

Furthermore I wish to affirm that colloid chemistry in medicine has come to stay and the sooner systematic and serious research of the varieties and forms of protein (animal vegetable and bacterial) and their particular reactions to infection is made the more valuable will become our therapeutic strength to combat disease.

On the other hand I wish to state with some seriousness that we should not draw con-

cartilage if closely approximated in large doses. Bone necrosis from this cause is much less frequent since we have eliminated unfiltered emanation but it is still a factor.

Since the majority of the growths under consideration arise in or extend into the antrum it may be well to outline briefly our exact procedure in treating them. External radiation with both short wave length X rays and heavily filtered radium is applied over the antrum and adjacent parts. This produces a marked inhibition of tumor growth. We use both X rays and radium for this because we feel that by varying the quality of radiation larger doses can be given with better clinical results. Following the external treatment capillary gold emanation tubes are inserted directly in the tumor through its ulcerating surface or the point of bone necrosis and left in place. If tumor tissue is present in the nasal passage it is treated likewise. From 10 to 15 tubes of 2 to 3 millicurie value are used the number depending on the size and extent of the tumor. Ten days to a fortnight later the antrum is exposed widely by removal of its floor and anterior wall and the tumor bearing area cleaned out as carefully as possible. When the packing is introduced a bulb of filtered radium is put in with it at the central point of the cavity or in another location according to the local conditions which obtain. Usually a dose of 2, to 40 millicurie emanation is used for this purpose and is removed with the packing at the end of 48 hours.

If the tumor has invaded the orbit we remove the eye so that access may be had from both above and below. Such a procedure may very well be considered mutilating but in our experience has proven to be well worth while. It provides the only means of accurate radium application and in addition facilitates drainage. We have failed in a number of cases by attempting to apply radium through the antrum and nasal passages after growth had extended into the orbit.

The procedure which I have outlined thus far applies of course to the case in which we feel we have a reasonable chance to control the growth completely.

If the patient's general condition is poor and the growth is very extensive invading the

orbit ethmoid and possibly the sphenoid cells or if inoperable cervical metastases are present then nothing but palliative measures should be considered. For this external radiation plays the greater part. Small amounts of filtered interstitial radiation may be employed at times but always with caution.

As for the choice of method in removing the radiated tumor tissue I believe there is rather little to be said. We depend upon radium and X rays to devitalize or destroy the growth. The only points to be considered in removing it are simplicity and a minimum of trauma. The use of scalpel and curette is bloody and necessitates too much manipulation of tissue. The old fashioned cautery is clumsy and brings in the factor of too much heat. The same may be said of the use of soldering irons except that small ones are not as cumbersome to handle. We have found that coagulation of the entire area by means of the high frequency cautery and removal either with curette or the high frequency cutting needle furnishes the desired result with a minimum of trauma. It can be done very satisfactorily under local anesthesia.

So far I have made no reference to the treatment of metastatic cervical nodes secondary to the various types of carcinoma encountered in the paranasal sinuses. For these we follow the same procedure as has previously been outlined for metastatic nodes secondary to intra oral carcinoma that is a combination of X rays radium and surgery.

All necks are radiated with short wave length X rays. If no nodes are palpable the case is kept under careful periodic routine examination. If an enlarged movable node with presumably intact capsule is present on admission or appears later the X radiation is supplemented by radium packs and following this a unilateral dissection done under local anesthesia. Radium emanation is always buried in the wound at the time of the surgical dissection. If the metastatic node has perforated its capsule and the infiltrating growth is fixed in adjacent structures we class the case as inoperable. External radiation is continued and emanation tubes implanted in the mass as a palliative procedure but no dissection is attempted. Likewise if the

leeway in the choice of the protein used. They have emphasized that the reaction is essentially diphasic the first phase being characterized by the rather violent general symptoms and by the increase in the local inflammation and the second phase characterized by the definite beneficial effects and the resolution of the inflammatory process as has already been emphasized. Therefore no patient should be submitted to this reaction unless the patient is a good clinical risk well able to stand the augmentation of disease incident to the first phase. Further inasmuch as when all is said and done the effects of non specific protein therapy are in the main dependent upon the stimulation of the cells such non specific protein therapy should be used while the cells are still definitely capable of stimulation and it must of necessity be of less value when the cells affected are exhausted by long drawn out disease. The question of dosage should be most carefully watched for deaths from excess dosages have been reported by Eggerton Krause and Mazza Borral and other observers also Wischardt has shown that while small doses stimulate the cells larger doses depress the cells. In the event that serums are used the question of hypersensitivity to such serums should be carefully determined before the serum is injected into the patient. If the hypersensitivity is present which can safely be determined by a preliminary skin test the patient should be desensitized before the serum is administered. In the case of vaccines proteoses and milk the question of hypersensitivity is unimportant but in the case of serums there is a definite danger which should be guarded against. Diabetes pregnancy and alcoholism are also said to be contra indications of the use of non specific therapy.

In the American clinics we find three proteins commonly used in the non specific protein reactions. The first of these is milk or some of its derivatives. This is certainly the mildest. The reaction which it produces is probably the most variable as are like wise the therapeutic responses elicited. Antidiphtheritic serum is the second protein commonly used but it has been remarked that the non specific reaction elicited by the concentrated serum at present used is not so sharp as that elicited by the original unconcentrated serum. The third protein commonly used is typhoid vaccine which may be used either subcutaneously or intravenously. With this serum the dosage can be much more exactly controlled the response elicited can be prophesied with much greater accuracy and therapeutic results obtained have been at least equal to those observed following other forms of non specific protein therapy. Our choice of proteins in any clinic should not be limited to one protein. Nor should the non specific protein reactions ever be used as a routine in any given type of case. While it is indeed one of the most valuable therapeutic weapons we have it is nevertheless specialized therapy. The age and condition of the patient and the duration of the disease should be carefully considered before any specific protein is

chosen. In the case of a debilitated patient or when a mild reaction is desired milk seems to me to be the protein of choice. In the event a more certain reaction is desired antidiphtheritic serum may well be used after preliminary tests are made to determine the question of hypersensitivity.

If the local disease is advanced to any degree a much sharper stimulus will probably be needed to activate an organism or cell fatigued by disease. If the patient is a good clinical risk intravenous killed bacilli may be used. But in non specific protein therapy which should always be considered specialized and never routine therapy no hard and fast rule should be laid down. Our choice of protein and dosage should be governed by the reaction we desire to produce and this should be controlled by the condition of the inflammatory lesion and the general condition of the patient.

DR G ORAM RING During an operation for cataract on a man 82 years of age the cataractous lens became completely dislocated into the vitreous. No further effort was made by the operating surgeon to remove it. A stroke of apoplexy 6 years before bespoke a definite cardio-renal history. The eye was in a condition of chronic iridocyclitis with secondary rise of tension and was nearly sightless. Constitutional and local medication relieved the pain but lachrymation redness and tenderness remained and 3 months later enucleation was done under general anesthesia. Ten minutes after being returned to his room the patient stopped breathing but respiration was ultimately re-established. After preliminary iridectomy the right eye was extracted April 1924 under local anesthesia to eye and lids. The following day the wound was healed, the anterior chamber reformed and the eye doing well. It so continued until the end of the fourth day. Violent endogenous infection next threatened the loss of the eye. A standard preparation of diphtheria antitoxin was employed together with the subconjunctival use of cyanide of mercury 1:3000.

In the cases previously reported the protein therapy was regarded as having been the active agent responsible for the improvement since no cyanide was used. The protein in the cases I am reporting was used in the first case 48 hours in advance of the cyanide and in the second approximately 24 hours previously. Improvement began prior to the use of the cyanide but was accentuated following the subconjunctival injections.

Ten cubic centimeters of the standard antitoxin solution was given in three doses with a total of approximately 1.630 milligrams of protein. The protein was administered at intervals of 48 hours the cyanide closely following the last two injections.

The return of the normal tint to the iris was associated with the clearing of the cornea and anterior chamber and the absorption of the pupillary exudate. A flattened membrane remained above to which the iris was attached. The eye was quiet and perception and projection were normal. Two infected teeth proved to be the source of toxemia and were

SINUSES would probably be less discouraging if the diagnosis could be made at an earlier stage when the disease is not so extensive and thorough and radical combination treatment could be applied. Toward earlier diagnosis I would urge that every rhinologist keep in mind the possibility of malignant disease and when in doubt have an X-ray study made. This X-ray study should be very thorough otherwise it may be misleading. The extent of invasion and often the extent of the associated exudative and inflammatory processes can be determined. An X-ray study will show that in malignant disease the septa and walls of the sinuses are destroyed. This destruction has a different appearance from the destruction caused by a pyogenic process. The destructive process would resemble only a very acute stage of a pyogenic process in the acute inflammatory processes the diagnosis of malignant disease would not have to be considered. In the chronic inflammatory processes which are the type to be compared with malignant disease destruction of bone is associated with a defensive process on the part of the organism indicated by sclerosis associated increased density at the border of the destruction and thickening of the cell wall. The opacity of the sinuses is also demonstrated together with the erosion of the wall or pressure of the walls. If the growth is relatively benign there may be pressure and displacement effect from the growth.

If the diagnosis is still doubtful a section should be removed for microscopical study. The operation should be an open one with a wide opening through the face rather than through the mouth not only for the reasons already given but for the sake of having the drainage which occurs in connection with the sloughing process outward instead of in the mouth and throat. I believe that the best method of destruction is by means of the radiotherm or electrocoagulation equipments. Especially in those cases in which there is considerable pain I would urge that preliminary to any destructive process the patient have a ligation of the external carotid to control hemorrhage and at the same time a resection of the fifth nerve. In this way the subsequent operative procedure can be carried on without an anæsthetic and practically without hemorrhage.

I would urge with regard to radiation that before the operation the patient be treated by high voltage X-rays from every angle by cross firing upon the disease and that this treatment be very thorough preferably given daily and so controlled and measured as to do no harm but to deliver the maximum quantity into the diseased tissue.

At the time of the operation I believe that it is advisable to use filtered radium rather than radium seeds for the sake of eliminating further necrosis and of getting a more distant effect on the cell that might still be invaded by the malignant disease.

PELVIC HERNIA

REPORT OF A CASE OF POSTERIOR VAGINAL HERNIA¹

By LEF MONROE MILES B.S. M.D. PEKING CHINA

Assistant Obstetrician and Gynecologist

HERNIA occurring at the outlet of the pelvis have usually been classified into groups according to their point of appearance at the body surface. Thus they have been called pudendal, perineal or vaginal. It would seem advisable as in the case of other hernia to have one term which would include all those hernia originating in a given region. For the hernia into the inguinal canal we use the one term 'inguinal' and describe the variety by an added term 'direct' or 'indirect,' while hernia through the anterior abdominal wall with the exception of those at the umbilicus are called 'ventral hernia.'

Chase (3) believes that the term 'levator hernia' as suggested by Blake is the most appropriate since it indicates the point of origin of these hernia. While this term is most fitting for the pudendal and perineal varieties of these hernia it does not apply to those forms which occur in the midline anterior and posterior to the uterus because at these two sites hernia do not traverse the levator muscles or fascia but pass between the muscles.

For this reason the writer proposes the term pelvic hernia as being an inclusive term describing all hernia through the pelvic floor and the point of egress of the hernia added gives the subvariety of the hernia the same as in the inguinal hernia. The recognition and use of this term would group these rare hernia together under one main head for purposes of indexing histories and medical literature. It would also be consistent with the best usage in nomenclature of hernia bringing these cases into harmony with the terminology of hernia in general which are named according to the point of origin and not of termination.

Hernia through the pelvic floor are of rare occurrence. Moschowitz (9) has reviewed the literature on the perineal variety of pelvic

hernia and accepted from the numerous previously reported cases as genuine 24 cases and added 1 of his own making in all 25 cases of the perineal variety.

Chase (3) reviewed the literature of the pudendal variety of pelvic hernia and found 12 cases previously reported and added 1 of his own, making a total number of 13.

As has been frequently pointed out there are two possible points at which a hernia protruding into the vagina may originate that is posterior to the uterus in the cul-de-sac and anterior to the uterus between the bladder and the uterus. A hernia may also originate lateral to the uterus either anterior or posterior to the broad ligament and appear in the vagina covered by a complete sac of vaginal mucosa this has been described twice by Thomas (12) and by Ethendge (4). These cases will be taken up later.

In reviewing the literature on vaginal hernia a greater degree of confusion of terms and description prevails than in either perineal hernia or pudendal hernia. Some authors have classified both cystocele and rectocele as vaginal hernia while by far the greater number of cases reported on close analysis turn out to be cases of prolapsus or descensus of the uterus accompanied by a bulging of abdominal contents into a distended cul-de-sac. Several cases were of complete traumatic rupture of the vaginal wall and cul-de-sac with protrusion of uncovered intestines and 1 case was an operative rupture of the cul-de-sac with protrusion of viscera.

Cystocele and rectocele should be excluded from the classification as hernia. One of the requisites of a hernia of the abdominal organs is the presence of a peritoneal sac which is entirely lacking in these two conditions. They are really prolapses of the anterior or posterior vaginal walls.

In descensus or prolapsus of the uterus accompanied by abdominal viscera bulging

THE VALUE OF PERITONEAL SHEETS OF COALSCENCEN IN ABDOMINAL SURGERY¹

1 Y DR ALITO CUTHITZ BENOS MIRE ARGENTINA
C O C C B z

All peritoneal sheets of coalescence are remarkably serviceable in abdominal surgery. It is through them that certain fixed segments of the digestive tract may be made movable. Intestinal mobilization (the term mobilization will be used in the sense of making a portion of the gut freely movable) represents the preliminary and fundamental element in every surgical intervention on an intestinal segment that has become secondarily fixed by the process of coalescence.

ETIMIOLOGY

The primitive alimentary canal of the early embryo is a comparatively straight simple tube occupying a mid sagittal position. In the abdominal region the canal lies within the body cavity (coelom) which is lined by parietal peritoneum. The visceral peritoneum is reflected from the mid dorsal line as a double layer the dorsal mesentery which extends to the caudal end of the digestive canal. This is divided into the dorsal mesogastrium (which becomes the greater omentum) the mesoduodenum the mesentery and the mesocolon which support respectively the stomach duodenum small intestine and the colon. The vessels and nerves pass within these to the canal. The spleen and pancreas are in the dorsal mesentery.

Cranially and anteriorly there is a primitive ventral mesentery containing the liver from which the falciform ligament of the liver and the lesser omentum are derived.

The stomach undergoes a rotation on its longitudinal axis so that its anterior border (the *C* or curvature) is directed upward and to the right and the posterior border (greater curvature) inferiorly and to the left. The surfaces shift so as to face anteriorly and posteriorly rather than laterally. The cardiac end of the stomach and the terminal end of the gut are displaced to the left of the mid line while the duodenum moves to the right.

The vitelline gut develops in a more complex manner. The portion of the gut destined to become the small intestine and the colon form a loop ventrally with the superior mesenteric artery as an axis directed toward the umbilicus. A rotation of 180° from left to right with the superior mesenteric artery as an axis takes place and thus the proximal limb of the loop becomes the small intestine and the distal limb the colon. This carries the caudal end of the duodenum (third part) to the left of the midline to its position in the adult. The remaining segments of the gut take their re-

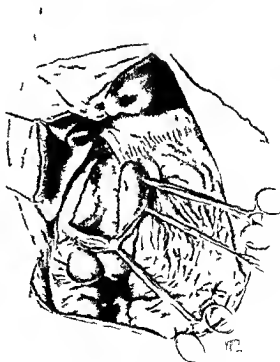


Fig. 1. Illustration of the second part of the duodenum. The ascending part is shown inferiorly and the left flexural part of the duodenum is reflected to the left to show the position of the retroperitoneal structures. The right kidney is at the posterior surface of the reflected duodenum.

On examination the pelvic organs were in normal position and the bladder was in normal position in the pelvis. The hernia originated in the right vaginal fornix through an opening anterior to the broad ligament. It was proposed to perform a laparotomy and with the hernia held in reduced position by an assistant's hand in the vagina to suture the sac into the incision in the abdominal wall. This was carried out and it was discovered that there was an extraperitoneal mass of fibrous tissue attached to the apex of the hernia sac which was removed by incising the peritoneum of the sac and the operation was completed by suturing the sac into the abdominal wound. The patient made a good recovery.

Four cases of hernia occurring in the midline posteriorly and separating the rectum and vagina have been reported at operation.

CASE 6 Huguer (6) The patient 46 years of age was operated upon November 18, 1911 for prolapse of the uterus vaginal prolapse and hypertrophy of cervix. First operation Curettage amputation of cervix anterior colporrhaphy perineorrhaphy and abdominal hysterectomy Doléris operation.

In May 1912 the patient returned stating that the condition had recurred. At examination a soft tumor about half the size of a mandarin orange was found in the midline posterior to the vagina bulging into the vulva. Rectocele was the diagnosis made. At operation a hernial sac was found in the midline of the vaginal wall separating the vagina and rectum. This was dissected upward for 8 centimeters and was opened ligated and excised. Operation was completed by suture in the midline of the levator muscles at several levels.

CASE 7 Lothrop (7) The patient 41 years of age multipara suffering from lacerations at childbirth in July 1908 was operated upon for rectocele cystocele and abdominal fixation of uterus for prolapse. In December 1908 she was operated upon again for rectocele. Again there was a recurrence of protrusion from the vagina. In 1909 she was delivered of a child following which the mass increased in size. She was seen by Dr. Lothrop in September 1912. At examination a mass the size of a fist was discovered protruding from the posterior wall of the vagina in the midline. It was easily replaced disappearing on lying down. It was not a rectocele as a finger in the rectum did not enter the tumor.

Operation was carried out by the abdominal route. The uterus was not prolapsed but was still attached to the anterior abdominal wall. The neck of the sac was in the midline at the bottom of the cul-de-sac. The sac contained coils of small intestine. The broad ligaments were divided close to the uterus and the uterus was split in half and the anterior half including the uterine cavity was removed. The sac was then dissected out and the broad ligaments were turned down and sutured across the defect in the pelvic floor. The part of the uterus remaining was also sutured to the pelvic fascia at either side of the rectum and the peritoneum was closed over both broad ligaments and the uterus.

She was seen 3 months after operation and there was no recurrence.

CASE 8 Hartmann (8) The patient 30 years of age was delivered of her first child at 27 years of age. A perineal laceration was repaired later. She was again delivered at the age of 24 and suffered from prolapse of the uterus which was corrected by an abdominal fixation of the uterus. Two years later a perineorrhaphy was performed. She was again delivered at term at 29 years of age. Follow-

ing the confinement the prolapse reappeared with identical appearance as before the hysterectomy only larger. She was seen by Hartmann in 1910 who described the condition as a large smooth round mass protruding from the vagina in the midline posteriorly. The tumor could be reduced by taxis with a gurgling sound. The perineum was thick and strong. There was no rectocele. The uterus was not prolapsed.

At operation in June 1911 the hernia sac was dissected upward from the vaginal route separated from the rectum and vagina and excised above the level of the cervix. Coils of small intestine were found in the sac. The cul-de-sac was closed with sutures and the rectal and vaginal walls sutured together obliterating the hernial space. The perineum was reinforced.

The patient was again confined in April 1913 more than 2 years after operation and there was no recurrence of the hernia.

CASE 9 Sweetser (9) The patient a 21 years single had never been pregnant. The past history was negative except for salpingectomy and appendectomy apparently for pyosalpinx and later typhoid fever. Her present trouble dated from the attack of fever in 1914 when she noticed a swelling in the midline of the vagina posteriorly. This increased in size as she resumed her work. The tumor interfered with her work though she experienced no sharp pain. The tumor would almost disappear in the recumbent position. The vaginal orifice was much relaxed and on straining the posterior wall bulged inward producing a tumor the size of a small orange which was easily reducible. The uterus was in normal position. The perineum was intact and the rectum did not take part in the tumor.

Operation perineal route. The hernia was dissected up to the level of the cul-de-sac and then the abdomen was opened and the hernia ring was closed from above. No bowel coils were in the sac which contained fluid. The abdomen was closed and again through the perineal incision the sac was ligated and excised and the levator muscles were sutured over the stump. Convalescence was uneventful but efforts to trace the patient were not successful.

AUTHOR'S CASES

CASE 10 Pu Chung Shih a Chinese woman 46 years of age was admitted to the Peking Union Medical College Hospital on September 3, 1924. Her complaint was great swelling of the abdomen which had begun 2 years prior to admission and had increased in size until she was greatly distended. Her past history was negative. She had given birth to 3 full term children the last 19 years ago. She had been frequently needled by native Chinese doctors during the course of her disease.

Physical examination revealed a very emaciated woman with a greatly distended abdomen. The circumference of the abdomen at the umbilicus was 126 centimeters and from the xiphoid cartilage to the symphysis measured 62 centimeters. The abdomen presented to palpation a smooth tumor mass with a marked enlargement in the upper abdomen and another in the lower abdomen with a distinct depression above the level of the umbilicus. Percussion note was flat all over the abdomen. A distinct fluid wave could be detected on tapping the abdominal wall and with the flat hand making sudden pressure on the flanks a wave of free peri-

spective places but at first retain their mesenteries and are freely movable

Fixation follows accommodation with accompanying changes in the mesenteries and peritoneal relations

Of the colon only the transverse segment retains its mesentery the cæcum becomes free and the remaining portions become fixed to the posterior abdominal wall or the underlying viscera Rarely the ascending and descending colons retain a very short mesentery

Wherever the visceral peritoneum on the mesentery of a portion of the gut is placed in contact with parietal peritoneum or the peritoneum of another organ the mesothelial layers of both are lost and the conjunctiva (fibrous layer of the peritoneum) become fused giving rise to connective tissue sheets known as the sheets of coalescence Wherever this fusion takes place between the visceral peritoneum of an organ and the parietal peritoneum the organ becomes retroperitoneal

THE SHEETS OF COALESCENCE AS A MEANS OF ENTRANCE TO UNDERLYING REGIONS

These sheets do not contain vascular elements or nerves and are therefore especially desirable avenues of approach to the underlying regions

Access to these regions may be gained by sectioning the peritoneum at the line of fusion farthest from the root of the primitive mesentery and reflecting the organ and its vessels toward the midline reproducing the embryonic mesenteries This makes the segment freely movable (Fig 3)

IMPORTANT SHEETS OF COALESCENCE

A brief discussion of the formation of each of the more important sheets of coalescence may serve to clarify their location and to bring out their surgical importance

The retro-duodeno pancreatic sheet of Trendelenburg When the stomach and duodenum rotate the mesogastrium and mesoduodenum containing the spleen and pancreas are carried to the left in such a manner that the left side of the mesentery duodenum and the pancreas are brought in contact with the dorsal body wall The result of this contact is an absorption of the two mesothelial layers and a fusion of

the connective tissue underlying them It is therefore possible to remove the duodenum and pancreas from the body wall by splitting this sheet of coalescence without danger of injury to their vessels and nerves (Figs 2 4 and 6)

The colo epiploic sheet As the dorsal mesogastrium develops into the great omentum and comes to lie over the transverse mesocolon the colon at this time having assumed a transverse position the upper portion of the posterior layer comes in contact with the anterior layer of the transverse mesocolon and fusion occurs Here there is formed a sheet of coalescence which may be taken as a route to the posterior wall of the stomach and the anterior surface of the pancreas without destruction of vessels The advantages of this means of approach to the stomach in doing gastroenterostomies will be discussed later

The posterior duodenal sheet The rotation of the duodenum to the right and its subsequent opposition to the anterior surface of the right kidney and the inferior vena cava results in the formation of a retroduodenal sheet which makes possible the reflection of the descending and transverse portions of the duodenum to the left with an exposure of the hilus of the kidney and the posterior surface of the duodenum (Fig 1)

The sheet of coalescence of the lower ileum and ascending colon After the cæcum and lower portion of the ileum shift to the right inguinal region the ileum and occasionally the cæcum become fixed to the posterior abdominal wall These portions may be mobilized by reflecting them toward the midline (Fig 2) By carrying the procedure upward the entire ascending colon and the right extremity of the transverse colon may be mobilized Such an exposure would bring to view the right kidney descending and transverse parts of the duodenum head of the pancreas ureter internal spermatic artery and the inferior vena cava

The retrocolic sheet of Pierre Duval The descending colon and frequently the iliac portion of the sigmoid colon become fixed to the posterior wall forming the retrocolic sheet of Pierre Duval The reflections of these segments of the gut to the midline expose the structures lying on the left posterior abdominal wall (Fig 3)

in bed with considerable embarrassment of respiration. The heart was normal, the lungs were evidently displaced upward as the liver dulness was considerably higher than normal auscultation revealed moist râles throughout the chest.

The abdomen was greatly distended and was tense. Fluid wave was elicited throughout the abdomen and to percussion the abdomen was dull throughout. No intra abdominal tumors or masses could be palpated. The circumference of the abdomen at the level of the umbilicus was 134 centimeter.

On vaginal examination we found protruding from the vagina posteriorly in the midline a pinkish soft fluctuant mass about 5 centimeters in diameter and 7 centimeters in length. Pressure on this mass caused reduction in its size with no gurgling sound. The outlet was parous but not relaxed. Rectal examination showed no rectocele. The cervix was high and the fundus of the uterus could not be definitely palpated. No pelvic or abdominal masses were felt. Movement of the cervix and the uterus with the fingers in the posterior vaginal vault gave the sensation of moving a body through fluid.

The lower extremities were very edematous.

The patient denied having been needled by Chinese doctors but on the abdominal wall there were three shallow ulcers to the left of the midline below the umbilicus which would appear to negate her denial.

A tentative diagnosis was made of vaginal hernia ascites and probably some tumor of the ovaries as a cause of the amenorrhoea and ascites.

Paracentesis of the abdomen was done on the evening of admission and 25 liters of ascitic fluid were removed. After removal of this fluid a large irregular nodular tumor could be palpated in the abdomen. This tumor extended from the pelvis to the costal margin, was more prominent on the left side and was fairly freely movable but at the same time seemed to have attachments in the upper abdomen.

Following paracentesis the edema of the legs disappeared in 12 hours, the vaginal hernia disappeared and the lung condition cleared up.

Our final preoperative diagnosis was vaginal hernia, multilocular cyst of ovary with the possibility because of the ascites that the tumor might be a fibroma instead of a cyst.

Operation was performed on September 9 by Dr. J. P. Maxwell, Dr. Miles assisting. The tumor was found to be a large multilocular cystadenoma of the left ovary with a twisted pedicle and numerous vascular attachments to the omentum. It was removed without great difficulty.

The pelvic condition was then explored. The cul-de-sac was found to be greatly enlarged, the uterosacral ligaments were stretched and the cul-de-sac was much broader than normal and also deeper, a pouch the size of a large orange being formed below the uterosacral ligaments. The uterus had not descended but was higher than normal.

In the bottom of this enlarged pouch there was an opening that would admit a finger only extending downward between the rectum and the posterior vaginal wall. This sac when distended with ascitic fluid must have been the protruding mass noticed at first examination. The writer then closed this hernial sac and the enlarged cul-de-sac after the manner described by Moschcowitz (8) by insertion from below upward of a series of purse string sutures of medium silk completely obliterating the cul-de-sac and uniting the anterior rectal wall to the posterior surface of the uterus up to the level of the internal os. This closure was not difficult.

The operation was completed by closing the abdomen in the routine manner. Convalescence was uneventful.

ANATOMICAL RELATIONS

From a study of these cases it will be seen that the hernia which appear in the vagina most frequently originate in the bottom of the cul-de-sac and the internal ring is formed by the two uterosacral ligaments and the anterior rectal wall. This occurred in 5 of the cases operated upon and apparently in 1 case not operated upon. In these cases the course of the hernia was directly in the midline separating the rectum and vagina and appearing in the vulva or protruding through it in the posterior commissure. The contents of the sac in 2 cases was fluid only, in 2 cases contained loops of small bowel, in 1 case contents of sac were not stated and the cases not operated upon also quite evidently contained bowel. Of the 5 cases operated upon two had no rectocele (Sweetser Miles) while in the others rectocele was evidently present as in 3 cases (Huguer, Lothrop and Hartmann) the patients had undergone operations for correction of rectocele and in the fourth (the author's case) rectocele was present and was demonstrated at operation. In one of the other operative cases (Thomas) the hernial ring was anterior to the broad ligament through the levator muscle but the hernia instead of descending lateral to the vagina and appearing in the vulva appeared in the vagina and the accumulated vaginal wall formed one of the covering coats of the hernia. This would appear to be the condition in the case of Etheridge though in this latter the protrusion appeared more nearly in the midline anteriorly and was not nearly so large.

body of the pancreas by splitting the colo epiploic sheet of coalescence (Fig 6)

Separation of the colo epiploic sheet offers great advantages in gastric surgery in fact once the separation is effected and the omental bursa is opened the entire posterior surface of the stomach is exposed It is then possible to discover and suture gastric perforations Adhesions of the stomach to the anterior surface of the pancreas may also be isolated

It is easier in gastro enterostomies to take the jejunum through a mesocolic rent to the stomach after the colo epiploic sheet is separated than to carry a portion of the posterior wall of the stomach through the transverse mesocolon to the jejunum as in the classical method, for very often the gastric cone that is exposed is too high above the pylorus In such cases one of the fundamental precepts of surgery is violated the stoma being too great a distance from the pylorus

A STUDY OF THE INFLUENCE OF PROTEIN THERAPY ON EXPERIMENTAL STAPHYLOCOCCUS INFECTION OF THE CORNEA OF THE RABBIT¹

BY BEN WITTKOFF, M. A. M. D. F. A. C. S. NEW YORK

I FEEL that it may be fitting and opportune at this time to discuss a phase of the subject of protein therapy not heretofore referred to or discussed in connection with this work but one however which is of especial importance in arriving at conclusions about it I refer particularly to the study of the influence of protein therapy on experimental staphylococcus infection of the rabbit's cornea which of course must be regarded as fundamental in theory and in the practice of protein therapy

I shall not review the history of this therapy or discuss the theory of the non specific reaction and its probable mechanism of effect Nor will I touch upon the now changing standards of immunity in this connection Nor can I but refer to what is known today as 'colloid chemistry' and the 'colloidal state' of given substances (according to August Lumiere and Kopaczewski) Although these theoretical and chemical phases of the subject are of intense interest and we hear recently from Professor Lumiere that the mechanism of the mysterious colloids holds in suspense the future progress of biology the time allotted to me will not permit more than a passing reference to these phases

In this field of research the principles are no longer recognized as entirely opposed to

the accepted standards of bacterial activity of specificity and immunity This status has come to pass through the pressure of insistent demand on the theorist by the accumulating evidence of clinical results in human and in animal experimentation Although Ehrlich's side chain theory may best explain the specificity and mode of action of various antibodies there is a growing tendency to explain many of these reactions on a physicochemical and colloidal basis Antigens are substances that cause antibodies in the body fluids And without exception antigens are colloids and are usually protein in nature Furthermore antibodies are colloid in their chemical characteristics, while they may or may not be solutions of colloids they are in the final analysis products of cellular activity and therefore derived from colloidal solutions (colloid dispersions)

Now since there is no longer any doubt that the positive systemic reaction to protein injection is a valuable therapeutic measure it has become a matter of some debate as to the relative value of different forms of protein or different preparations of the same form All of the problem of dosage and the timing of the injection in relation to other treatment offers a field for investigation which up to this time has not even been approached

vagina or protruding from the vulva which disappears when the patient lies down and reappears as the patient assumes the erect position or bears down with the abdominal muscles or coughs. Manual replacement of the mass if it contains coils of bowels should be accompanied by a gurgling sound. If the sac contains fluid only, this sign will be absent.

Hernia must be differentiated from vaginal cysts. Inclusion cysts in the lower vagina present a characteristic appearance but cysts of the ampulla of Gartner's duct in the upper vagina might readily cause confusion. Cysts are without symptoms of strangulation and are generally irreducible though rarely a Gartner's duct cyst appearing in the vagina can be reduced on pressure the fluid returning along the duct to a cyst of the parovarium in the broad ligament. Vaginal cysts are usually lateral to the cervix.

Diagnosis will probably be made most frequently at operation and all large rectoceles should be suspected of being complicated by a hernia and in all such cases the vaginal wall should be dissected high up and a search made for the hernia sac. Unless this is done a small proportion of cases will apparently recur the hernia will again protrude and the patient will be dissatisfied with the treatment.

TREATMENT

Of the 6 operative cases reported 3 were done entirely through the perineal route 2 by abdominal route only and 1 by combined perineal and abdominal routes. Only 1 case that of Hartmann, done by the perineal route has been followed up for a long period of time and apparently resulted in a cure. It would seem that the best results are to be obtained by a combination of abdominal and perineal operation. The sac should be dissected up to the level of the cervix and its contents reduced the neck of the sac ligated and the sac excised. The vaginal wound should be repaired in such a manner as to secure firm union between the rectum and vaginal wall and the perineum repaired. Then if possible the abdomen should be opened with the patient in the Trendelenburg position and the cul de sac should be obliterated according

to the technique devised by Moschcowitz (8), which consists in passing through the peritoneum and outer muscular coats of the rectum and vagina a series of purse string sutures of linen or silk and closing the cul de sac from below upward high on the cervix of the uterus. This was considered in my case but as the patient had just undergone an abdominal operation we hesitated to re-open the abdomen and hoped to secure relief by a less radical operation.

Such a radical operation as was performed by Lothrop does not seem to be indicated at the present time.

SUMMARY

The literature on the subject of vaginal hernia has been studied and 9 cases which appeared to be definitely of this order have been reviewed with 2 additional cases by the author.

The cause of these herniae is with one exception found to be traumatic following pregnancy or childbearing.

A new classification embracing all herniae occurring through the pelvic floor is offered following the general usage of terminology and classifying it according to its course thus pelvic hernia may be perineal pudendal or vaginal and vaginal pelvic hernia may be (a) anterior or (b) posterior. Prolapse of the uterus accompanied by a general enlargement of the cul de sac and protrusion of abdominal contents into the vaginal vault should be called either enterocele or vaginal enterocele and not a hernia.

The treatment is operative and the best operation is a perineal operation by which the sac is excised and the perineum is repaired combined with an abdominal operation for obliterating the cul de sac.

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to the toxic protein for a definite period while in the second instance following a sharp general reaction there is frequently a marked improvement of the infectious process. In both instances there is an increased resistance to the action of the toxic agent and the good results observed following non protein injection may be an expression of the increased cellular resistance observed in the stage of desensitization in anaphylaxis in other words the cells have been made more resistant to the infectious agent by the foreign protein.

The time of injection and the size of the dose have been given much consideration and have been referred to with some emphasis in my previous reports. The matter of anaphylaxis is of importance in this regard because sufficiently large doses are essential just as they are in the treatment of diphtheria in order to produce a suitable reaction and effect. This is necessary because the serum is almost immediately effective (ten minutes after injection Rosenau) and thus stage of preanaphylactic effect representing the incubation period of disease is the period of gradually increasing sensitivity of the body cells to the protein or disease element (bacteria) as a measure of body defense against the invader. The first stage of anaphylaxis is known to be one of exhalation and stimulation followed by one of depression paresis arrest of breathing etc. For this reason it is my practice after cauterizing an active ulcer of the cornea to have the serum injected as soon as possible. For the same reason we find an explanation for the constant observation that the effect of the serum is manifest always within 4 to 48 hours after injection the time of hypersensitivity and cellular reaction. It is clear therefore that the time of the injection is important as well as the size of the dose and the relation to local treatment.

In this connection I believe it is generally recognized that a case of hypopyon keratitis in a strong healthy young individual is rarely seen and when such cases are observed intensive local measures alone quickly yield the usual good result. On the other hand we find a pigmented ulcer of the cornea occurring commonly in the aged and in debilitated individuals usually following upon the neglect

of a local injury and the center of the cornea the area least protected by systemic resistance is the area almost invariably affected. Here, the problem of cause and effect is obvious. The question of virulence of the infecting micro organism on the one hand and the defensive powers of the host on the other is evident.

In an effort to secure a fixed virus of staphylococci by standardizing the virulence of a certain strain through 'passage' and then by suitable dilution of this virus I have attempted to obtain that dilution which will produce by puncture of the corneal stroma the slightest but active ulceration of the punctured area. It is clear that by this more certain means of standardizing the virulence and controlling the dosage of the infecting micro-organism the matter of resistance becomes the more direct unknown quantity in the problem of cause and effect. It was found that these dilutions varied greatly with the different strains of staphylococci taken from various parts of the body the most virulent strains being those taken from the eye. The dilution was as great as 1:30,000 (or cubic centimeter of bouillon culture of staphylococci diluted in 300 cubic centimeters of normal salt solution) in order to secure the minimum dosage that would produce the slightest but active ulceration of the rabbit's cornea. (One colony of the 24 hour culture of staphylococci in 10 cubic centimeters of bouillon was cultivated for 24 hours when 0.1 cubic centimeter of the bouillon was diluted in 300 cubic centimeters of normal salt solution, thus making a dilution of 1:30,000.)

The practical value of this is evident in this study because we are able thereby to observe the relative value of different forms of protein as well as the dosage necessary to produce the therapeutic effect and from this one can more definitely measure the resistance of the animal to the inoculation. Furthermore it makes one realize how minute must be as a rule the average quantity of micro organisms first infecting the eye in a clinical case of hypopyon keratitis or even in a penetrating wound and therefore if a highly potent protein can be injected before the infection has become overwhelming a satisfac-



Fig. 1. Low power view of vertebral metastasis showing large colloid-containing acini surrounded by simple low cuboidal epithelium immediately adjacent to area of papilliferous adenocarcinoma devoid of colloid.



Fig. 2. High power view of vertebral metastasis showing a field of normal appearing colloid-containing acini covered by a single layer of flattened cells in the midst of an area of adenocarcinoma.

in a manner entirely different from that which characterizes all other human tissues.

The literature and textbooks have persistently referred to this extraordinary circumstance since 1876 when Cohnheim (7) first reported a case of this kind which he designated *Einfacher Gallertknoten mit Metastasen*.

A woman of 35 developed a painful swelling in the left knee and dull pains in the left sacro iliac region accompanied by a hectic temperature. Aspiration of the knee joint gave relief for 6 months after which the fever returned and a large left sacro iliac abscess appeared and was incised. The deepest portion of the abscess was continuous with the bone which was curetted. Rapid emaciation and death followed. Necropsy revealed many small pea sized grayish white to grayish red homogeneous translucent masses in the lungs with similar gelatinous honey like deposits in the walnut sized bronchial lymph nodes. The skeletal examination showed invasion of the second third and fourth lumbar vertebrae with a reddish raspberry jelly like mass. The bone marrow of the right femur contained a similar soft mass of hazel nut size. The femoral cortex had been eroded from within producing wide dilatation of the medullary canal. Both lobes of the thyroid gland were enlarged the left more so than the right. The right showed normal follicular structure. In the left lobe were two large nodules. These showed a gelatinous structure identical with that of the masses in the lungs and bronchial nodes. There was no infiltration to neighboring structures. The smaller of the two gelatinous nodules had a small button like mass

which extended into a tributary of the inferior thyroid vein.

Microscopical examination of the gelatinous nodules in the thyroid gland and those of the bones and lung and bronchial nodes revealed the structure of simple colloid goiter. The curettings from the gluteal abscess likewise showed the typical histological structure of thyroid tissue.

Cohnheim said however that a few of the follicles were completely filled with epithelial nests. His conclusion was that the new growth in the thyroid was a simple colloid adenoma with multiple metastases. He rather slighted the significance of the direct growth into the vein by simply stating that it had been observed in many cases without metastasis. He attempted to explain the absence or presence of metastases in these cases of venous invasion by assuming that a special constitutional individuality made metastases possible in one instance and not in another.¹

In this case we have three important evidences of malignancy first multiple metastases second tumor thrombosis of the inferior thyroid vein and third proliferating cell nests in the thyroid acini. So it would appear as though this original paradoxical assumption of benign tumors with multiple metastases was based upon a false interpretation. Since this first questionable observation the literature has contained many analogous reports. That the writers of these subsequent similar papers were greatly influenced in their decisions by Cohnheim's interpretations as expressed in this original report is indicated

cubic centimeter of the emulsion was injected by means of a finely graduated pipette into the corneal channel prepared by the needle puncture. The latter method proved to be more accurate especially when we were dealing with high dilutions of a very virulent strain of staphylococci.

The method of injecting the protein consisted of inserting the needle into the flank of the animal just in front of the hind legs and carrying the needle forward into the abdominal muscles so that the natural act of jumping might aid in the absorption and rapid assimilation of the protein substance.

The animals were observed daily after inoculation and when necessary the ocular lesion was studied with the Zeiss magnifier for minute changes. Photographs were made in some instances when the observation was sufficiently clear and of some importance.

DISCUSSION

A study of these experiments shows the three stages of development which this work has undergone in the effort to secure delicate and accurate tests of the effect of foreign protein injection. The first stage embraces the first six experiments which show the comparative effects of protein injection when an unmeasured dose of staphylococci is used for inoculation but in which nothing as to dosage of injection or delicate difference in effect could be observed because of the very violent corneal reaction due to too concentrated an emulsion of the micro organism. The second stage is observed in experiments 7 to 19 inclusive in which it was recognized that if the minimum dilution of staphylococci that would produce active ulceration of the cornea could be determined more accurate and delicate observations would be forthcoming. The determination of the virulence of the staphylococci for corneal substance was attempted by first growing the micro organism in the eye of an animal the micro organism being recovered and the dilution of this employed for inoculation. But the varying virulence of the different strains of staphylococci isolated from different parts of the body upset this calculation as the experiments included in this stage demonstrate. Therefore

the third stage, which includes the last seven experiments (20-26) deals with the development of a more accurate method for determining the virulence of the bacteria designed to produce more definite bacterial effects. This was accomplished by passing the strains used (one from an acute conjunctivitis, the other from an infected throat) through the eye of three successive animals in an effort to standardize the virulence of the micro organism for corneal substance.

The success of the method of inoculation designed to bring about a definite and consistent corneal lesion, other things being equal depends upon two important factors the introduction of the needle and the application of the same amount of the staphylococcus emulsion in every instance. The first is less important than the second because it is relatively a simple manipulation. When the needle passes into the anterior chamber or comes forward through the surface of the cornea the event is readily observed and felt. In only two or three instances did either of these accidents occur in all the experiments performed and in none of these were the results recorded. The second factor application of the staphylococci proved its importance through the experimental results. The puncture and repuncture method was fairly accurate when a concentrated solution was used 1:100 as in the first six experiments. Obviously when so small an amount of the solution clings to the needle and is thus introduced into the sterile corneal channel it reduces the dosage also by the mere passage of it. In higher dilutions (1:10,000, 1:30,000) this method was found to be uncertain and perhaps inaccurate and for the same reasons as indicated by experiments 13 to 18. In higher dilutions it was found to be more dependable to introduce into the punctured cornea 1/100 cubic centimeter of the emulsion from a finely graduated pipette as noted in experiments 7 to 19. For this reason the latter method was used in the last seven experiments (20 to 26) in which the question of dilution and virulence was being tested.

Dilutions of the staphylococci emulsion varied from 1:100 (used in the first six experiments) to 1:30,000. At first it was

aberrant thyroid tissue has been repeatedly reported (Schrager 81, Wohl 82 Pollard 83, Gerster 84 Greensfelder and Bettman 85 Gutmann 86, Hinterstoisser 87 Kamsler, 88 Parcler Venot and Bonnin 89, Peyron, Ranque and Senez 90 Schuller 91 Pool 92 Berger 93)

But to this rule which limits quite sharply the regions in which thyroid tissue may be found as developmental arrests there is one exception. This concerns itself with the complex teratomata which may be encountered rarely in various parts of the body but chiefly in the ovaries testes and sacral region. Six instances have been recorded in this laboratory in which teriminal teratoid tumors (dermoid cysts) of the ovary have contained mature thyroid tissue along with the other mixed tissues that make up these complex tumors. In two of these the thyroid mass was as large as an orange. In most the structure was that of either a simple colloid goiter or an adenomatous colloid goiter. It is of interest to observe that thyroid tissue in ovarian teratomata of women of the Great Lakes region shows the same tendency toward goiter as that of the thyroid gland itself. One case in particular (Miss A B case 3026 AB) excites extraordinary interest because of the development of thyroid adenocarcinoma in such an ovarian teratoid inclusion. In this case in addition to the areas of adenocarcinoma there were small islands of medullary carcinoma with marked vacuolization of the epithelial cells. Kovacs (94) has recently described a case in which a thyroid tissue tumor of the ovary was accompanied by the symptoms of exophthalmic goiter which subsided after removal of the tumor.

Any argument that seeks to prove that distant masses of thyroid tissue represent ectopic thyroid anlagen is rendered further invalid by the fact that in many of the reported cases of benign metastasizing goiter there were multiple widely scattered foci of thyroid tissue. The claim of some authors that aberrant thyroid tissue may be the source of thyroid new growths in the mandible sternum and clavicle is rendered untenable by the fact that in the 77 cases

herewith analyzed, the skull was involved 30 times the vertebrae 25 times while the clavicle and sternum were each invaded 9 times and the mandible but twice. Further more the cases of clavicular and sternal metastases were almost invariably associated with multiple metastases involving other bones.

INADEQUATE STUDY OF REPORTED CASES

Perhaps the most convincing argument against the existence of the so called benign metastasizing struma is the fact that the great majority of reported cases were incompletely studied and hence do not justify positive assertions. In 29 cases only (38 per cent) of the 77 which I have gathered from the literature was tissue from the thyroid gland examined microscopically. In most of the remaining cases the histological study was woefully inadequate. Such cases demand the study of many sections. It is still customary in many laboratories to examine routinely but one or two sections. It is obvious that no conclusions should be drawn following such cursory study. Most authors have merely stated that the thyroid gland showed outwardly no signs of malignancy or that there was no recent accelerated growth. Such statements are of no value since a high proportion of cases of malignancy of the thyroid are discovered only after routine histopathological examination. A small pea-sized primary malignant adenoma or area of adenocarcinoma hidden deeply in an innocent appearing thyroid gland can readily give rise to extensive osseous and visceral metastases. Von Eiselsberg (95) Woelfler (73) and Huguennin (37) have emphasized that the primary thyroid tumor may be so small that it is only with great alertness that it can be found while metastases may be massive. In Huguennin's case it was only after repeated searches that he discovered in the inferior pole of the left thyroid lobe a small whitish area 4 by 5 millimeters made up entirely of carcinoma cells.

And in only 33 per cent of the reported cases was autopsy done! It is even more interesting to note further that in many of those cases on which microscopic studies

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growth so that an original carcinomatous area may eventually appear adenomatous.

The fact that carcinomatous metastases may possess identical morphological characteristics as normal thyroid tissue is illustrated quite clearly by the first of our 3 cases a description of which appears later in this paper.

Crone (9) studied 6 cases of supposed benign metastasizing struma and in 3 of these, tissue from the thyroid gland was later examined and undoubted evidence of primary thyroid carcinoma was found in each even though there was no clinical evidence of thyroid malignancy.

In the abstracts of previously reported cases which concludes this paper will be found 5 cases (indicated by asterisk) in which the metastases showed the histological architecture of normal thyroid tissue while microscopic study of tissue from the thyroid gland revealed areas of primary carcinoma.

Even though this tendency closely to mimic the mother tissue in cell structure and in colloid elaboration is highly developed in the metastases of thyroid new growths there are other tumor types which continue to perform in a more or less perverted manner their normal function. The enamel formation by adamantinocarcinoma, mucin formation by carcinoma arising in the bronchus or in the large bowel, melanin formation in the metastases of melanoblastoma and keratin production by squamous cell carcinoma constitute common examples.

In addition to the marked morphological similarity between normal thyroid tissue and that found in these distant masses there is proof of their ability to elaborate vicariously the specific internal secretion of normal thyroid cells. Von Eiselsberg (97) tells of a case in which total thyroidectomy for carcinoma was done by Billroth on a woman of 38 followed by typical signs of myxedema and tetany. These persisted for 2 years and then gradually regressed and ultimately disappeared as a nodule developed in the sternum. The sternal nodule gradually increased in size for 2 years and showed marked increase in size during menstruation and regression following menstruation. Finally it grew very

rapidly, causing excruciating radiating pains and 4 years after its appearance was extirpated. Grave signs of hypothyroidism developed following the operation and persisted. Microscopic examination showed colloid containing metastasis of a thyroid adenocarcinoma. Ewald (98) and Gierke (21) have demonstrated iodine in such metastases.

DETACHED NORMAL CELL THEORY

Much has been said concerning the extraordinary vascularity of the thyroid gland and the intimate relationship existing between the normal thyroid cells and the blood spaces. Even the existence of an interposed basement membrane has been denied (von Eiselsberg). The defendants of the benign metastasizing goiter theory claim that it is mechanically possible for normal thyroid cells to become detached and carried by the blood to distant structures and there set up independent growth ultimately assuming normal thyroid structure and function. The reason for this extraordinary growth energy of normal thyroid cells has never been suggested. It certainly leaves the burden of proof with the metastasizing goiter adherents. If normal thyroid cells possess this power to proliferate in a congenial environment and it would appear as though cancellous bone tissue provided such a favorable nidus then it is strange that artificial autoplasmic implantations of thyroid tissue to the long bones have not been followed by such proliferative and destructive growth. Then too if normal thyroid cells possess such an unlimited potentiality for growth in distant tissues and organs the remarkable infrequency of this occurrence argues against its probability.

The question might be asked if these are metastases of malignant epithelial tumors of the thyroid gland why do they not appear earlier in the regional cervical lymph nodes? Experience has shown that the metastases of thyroid carcinomata are almost entirely hæmatogenous and that distant dissemination is usually out of all proportion to the local lymphogenous metastasis.

An analysis of the reported cases indicates that the metastases while most frequently of slow growth are not delimited but in

clusions about protein effects too quickly but rather we should sift the data and take stock, as it were from time to time as to what has been shown to be reasonably true about it. We cannot accept much that we hear and read for protein therapy is too popular today to be all that is claimed for it. It is not a "cure all" by any means. In such instances the credulity of the laity and even the profession is at stake.

DISCUSSION

DR ALAN C. WOOD: Dr Key's method of producing corneal lesions in animals with the minimal bacterial stimulus is I think quite important. It should be remembered, however, that the resistance of the individual animal to the bacteria is a factor which can definitely enter into the healing of the inflammatory lesion and is a factor almost beyond our control. Such variations in the resistance of individual animals to a specific bacterial insult will of course cause definite variations in the healing processes which would follow the injection of a definite amount of non specific protein and this factor should be very definitely considered when the results as to the comparative value of the different non specific proteins which may be employed is considered.

Many years ago the Indian Plague Commission observed that anti plague inoculations had a beneficial effect on miscellaneous infections and drew attention to the therapeutic rôle that non specific protein might play. It was finally realized that any substance which would produce a general shock reaction often produced a therapeutic change. This reaction to non specific protein has been the subject of a great amount of study. This reaction is characterized by the chill which follows the injection of the non specific protein by the febrile reaction with fever sometimes of 100-106 degrees falling to normal within 24 hours by the increase in the pulse rate by the nervous irritability the increase in glandular activity nitrogen metabolism and permeability of the blood vessels later followed by a decrease in the permeability and an increase in resistance to poisons by increase of lymph flow by lymphocytosis chiefly of the polymorphonuclears and more rarely of the eosinophiles and the mobilization of the proteolytic enzymes and lipases with a decrease in the anti ferment content of the serum occasionally by the mobilization of specific antibodies and lastly the occurrence of a definite focal reaction around the focus of inflammation.

The inflammatory focal reaction is of special interest to us as ophthalmologists. It has been shown that every inflammatory focus will give a focal reaction after injection of a non specific protein. Schmidt has shown that a localized inflammatory process non tuberculous in type will react to an injection of tuberculin and other non specific agents nucle-

proteins nucleins etc. Wolff Eisner has recently stated that he believes this is due to a sensitivity against protein in general which is produced by a localized inflammatory focus. This focal reaction is definitely diphasic in character characterized in the primary phase by an increase in the inflammation in the secondary phase by a decrease in the inflammation and healing.

Numerous theories have been advanced by different observers to explain the beneficial results which can follow non specific protein therapy. Weichardt has supposed it to be due to a plasma activation resulting in a stimulation of the cell metabolism with a production of substances antibacterial in nature and a detoxication. Paltauf and Lowrey sought to explain the benefit of the non specific protein therapy on the grounds of stimulation of the heat regulatory mechanism. Hektoen, Ludke, Bull and others have shown that following non specific protein therapy there frequently results the mobilization of the antibodies specific for the primary infecting agent and they believe that non specific protein therapy may owe its beneficial effects to the fact that certain exciting agents are imperfect antigens containing the stimulus necessary for the production of antibodies by the cells but not the exfoliative stimulus necessary to cause the cells to throw off these protective antibodies into the blood stream. Such exfoliative stimulus they believe was supplied by the non specific agent. Starkenstein who has done extensive experimental work on the eye following the injection of non specific protein believes that the beneficial effects are due to the secondary phase of decreased permeability of the blood vessels with the resultant greater resistance to poisons. Jobling and Peterson have brought much evidence to show that the mobilization of the proteolytic enzymes is the most important factor in the controlling of local inflammation by non specific protein therapy believing in short that these proteolytic enzymes act as detoxicating agents by degradation of toxic split proteins to non toxic amino acid forms or by splitting up the protein to which the cells have become sensitized thus rendering it non toxic. More recently as Dr Key has said the attempt to explain non specific protein therapy on the basis of chemistry of colloids has been emphasized.

Further study of the non specific protein reaction has shown that there are an enormous number of substances which are capable in a greater or lesser degree of provoking the typical non specific reaction. Among such substances are the counter irritants the normal and immune serums antitoxins proteins egg albumin milk milk derivatives such as Dr Key has noted gelatin nucleoproteins nucleohexyl protein split products enzymes tissue extracts vaccines without number bacterial extracts colloidal metals yeast etc.

Observers who have studied the non specific protein reactions most carefully believe there are very definite contra indications to its use and

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Crone (9) studied 6 cases of supposed benign metastasizing struma and in 3 of these tissue from the thyroid gland was later examined and undoubted evidence of primary thyroid carcinoma was found in each even though there was no clinical evidence of thyroid malignancy

In the abstracts of previously reported cases which concludes this paper will be found 5 cases (indicated by asterisk) in which the metastases showed the histological architecture of normal thyroid tissue while microscopic study of tissue from the thyroid gland revealed areas of primary carcinoma

Even though this tendency closely to mimic the mother tissue in cell structure and in colloid elaboration is highly developed in the metastases of thyroid new growths there are other tumor types which continue to perform in a more or less perverted manner their normal function The enamel formation by adamantinocarcinoma mucin formation by carcinoma arising in the bronchi or in the large bowel melanin formation in the metastases of melanoblastoma and keratin production by squamous cell carcinoma constitute common examples

In addition to the marked morphological similarity between normal thyroid tissue and that found in these distant masses there is proof of their ability to elaborate vicariously the specific internal secretion of normal thyroid cells Von Eiselsberg (97) tells of a case in which total thyroidectomy for carcinoma was done by Billroth on a woman of 38 followed by typical signs of myxedema and tetany These persisted for 2 years and then gradually regressed and ultimately disappeared as a nodule developed in the sternum The sternal nodule gradually increased in size for 2 years and showed marked increase in size during menstruation and regression following menstruation Finally it grew very

rapidly, causing excruciating radiating pains, and 4 years after its appearance was extirpated Grave signs of hypothyroidism developed following the operation and persisted Microscopic examination showed colloid containing metastasis of a thyroid adenocarcinoma Ewald (98) and Gierke (1) have demonstrated iodine in such metastases

DETACHED NORMAL CELL THEORY

Much has been said concerning the extraordinary vascularity of the thyroid gland and the intimate relationship existing between the normal thyroid cells and the blood spaces Even the existence of an interposed basement membrane has been denied (von Eiselsberg) The defendants of the benign metastasizing goster theory claim that it is mechanically possible for normal thyroid cells to become detached and carried by the blood to distant structures and there set up independent growth ultimately assuming normal thyroid structure and function The reason for this extraordinary growth energy of normal thyroid cells has never been suggested It certainly leaves the burden of proof with the metastasizing goster adherents If normal thyroid cells possess this power to proliferate in a congenial environment and it would appear as though cancellous bone tissue provided such a favorable nidus then it is strange that artificial autoplasmic implantations of thyroid tissue to the long bones have not been followed by such proliferative and destructive growth Then too if normal thyroid cells possess such an unlimited potentiality for growth in distant tissues and organs the remarkable infrequency of this occurrence argues against its probability

The question might be asked if these are metastases of malignant epithelial tumors of the thyroid gland why do they not appear earlier in the regional cervical lymph nodes? Experience has shown that the metastases of thyroid carcinomata are almost entirely hematogenous and that distant dissemination is usually out of all proportion to the local lymphogenous metastases

An analysis of the reported cases indicates that the metastases while most frequently of slow growth are not delimited but in

removed. The infecting agent was the usual streptococcus viridans. In September 1924 an iridocapsulotomy resulted in vision of 20/50 plus.

In the case of Mr. B. I performed an uneventful preliminary iridectomy which was followed a few weeks later by the extraction of a so-called black cataract. The wound healing promptly with a resulting vision of 6/6. The eye continues in perfect condition. About 6 months ago a preliminary iridectomy was done on the fellow eye followed about a month later by the extraction of a black cataract. Rather more than the usual pressure was required to complete the extrusion but no vitreous was lost and the eye was left in what seemed to be a satisfactory condition with the edges of the coloboma in normal condition and the pupil black. Considerable transparent posterior cortex evidenced itself the next day by an astonishingly extensive amount of cortical swelling which marked the beginning of a lens toxemia. The eye ultimately became comparatively quiet with good perception and projection and a rather dense membrane above to which the iris was attached. This was so dense for a time that I feared it would have to be incised with a De Wecker scissors. To the usual local treatment was added the antitoxin with the final addition of two intravenous applications of arsenphenamin.

Despite all the attention the eye had received at the end of 3 months it still had a slight recurring flush. Five weeks ago under strict precautions a V shaped iridocapsulotomy was performed. The following day the eye had the appearance of a low grade infectious uveitis with no improvement in vision despite a satisfactory opening in the iris. We gave 4 doses of the antitoxin the volume equaling in protein content that outlined combined with an equal amount of cyanide of mercury subconjunctival injections 14000. A vision of 15/30 is the result.

The teeth should be X-rayed in all cases. It seems to me important that we record with as much exactness as possible the protein content of our solutions. I am advised by an expert associated with one of our leading laboratories that the total solids in the antitoxin solutions vary from 14 to 20 per cent. Taking 18 per cent as an average and deducting approximately 1 per cent for salts 17 per cent would represent the average solids in one cubic centimeter. Converting the cubic centimeter into grams and multiplying by the percentage of solids we arrive at the total protein content.

Dr. L. WEBSTER FOX. As to milk injections conclusions from a digest of the literature should be considered first. It would seem that there was considerable conflict in the reports from the countless workers and observers in this field and one would be led to believe that many of the reports were prejudiced from the very start either in favor of or against this form of therapy. The great weakness of the reports of an unfavorable nature is the very few cases cited by the observers making these reports. On the other hand those investigators who have had sufficient encouragement to continue the

treatment in a series of a thousand cases for instance must have had much greater benefit from their endeavors than their reports would indicate otherwise they would not have wasted valuable time in order to prove a worthless or dangerous procedure to have some value. We are greatly impressed by the uniformity in the reports of the Spanish and Spanish American workers from widely scattered sections. They are all favorable. On the other hand the Germans whose access to a good milk supply is not at all easy give an array of complications that would frighten any clinician and naturally they resort to laboratory refinements to produce something just as good. The treatment relieves pain prevents infection and does considerable good in purulent affections of the anterior segment of the eye.

Conclusions from our own experience. Our attention having been first brought to the matter by personal communication from two most reliable workers namely Van Lint and Fernandez we tried the treatment in the beginning as a prophylactic against postoperative and posttraumatic infection with most encouraging results and then gradually began to employ it routinely in all cases in order to give it a fair trial. In this large experience we neglected to tabulate the cases so that we could present the data without fear of criticism. Our last 80 cases however have proved to us several things. First the fever and leucocytosis are essential to the production of benefit. If there is neither there will be no benefit. Often there is little or no fever but an increase in the leucocytes. In these cases there is scarcely any noticeable change in the condition for which the injections are given. In those cases in which the factor of bacterial contamination has been taken into consideration by preliminary examination of the milk we find several little surprises. First there is very little difference in the reaction between pasteurized milk, certified milk and powdered milk (this being dissolved in sterile water immediately before injection). Such differences are not greater than those which might occur between two different examiners or on different days. It is also interesting to note that several specimens of certified milk showed a higher bacterial count than the ordinary commercial pasteurized milk a fact that would be of value to pediatricians and call for greater vigilance in the issuing of such certificates. All patients were somewhat improved. In none was the condition made worse or was the patient made to undergo any unnecessary illness as the result of the reaction. The ocular conditions most benefited were corneal ulcer, purulent orphthalmia and other purulent conditions affecting the anterior segment. Infection seemed to be prevented in traumatic and surgical case. Pain was relieved in many instances. We regard the treatment as safe and a valuable adjunct to our therapeutics but not necessarily important enough to replace other older and well tried measures. As compared to other forms of so-called protein therapy we regard it as superior.

on the ulnar side of both hands and forearms. There was no atrophy of the lower extremities. The movements of flexion and extension at the knee and ankle joints were weak particularly on the left. The toes of the left foot were moved with difficulty. The knee jerks were exaggerated on both sides more so on left. Bilateral ankle clonus and the Babinski reflex were present on both sides. Sense of motion and position of toes was lost. Just to the left side of the midline of the neck posteriorly at the level of the sixth cervical vertebra was a tumor of walnut size. It was sharply circumscribed and the skin was freely movable over it. It was not tender to pressure. The patient had no idea how long it had been there.

The patient was transferred to the Surgery Clinic for operation with a diagnosis of tumor pressing on spinal cord at about the sixth to eighth cervical segment. Laminectomy (fourth fifth sixth cervical vertebra) revealed the presence of a soft reddish hazel nut sized extradural tumor apparently originating in the left side of the body of the sixth cervical vertebra. It was easily separable from the dura with which it was in immediate contact.

Histopathological examination of this tumor showed many islands of colloid containing alveoli surrounded by a single layer of flattened epithelial cells. Other areas showed a papilliferous structure with taller columnar cells and little or no colloid. The pathological diagnosis was papilliferous adenocarcinoma of thyroid origin. For many years the patient had possessed a small soft symmetrical goiter which had never occasioned him any difficulty and which had not manifested any recent growth. Clinically there was no evidence of malignancy.

Following the removal of the spinal cord tumor many of the signs of spinal cord compression disappeared.

Seven months later the patient again appeared at the hospital with a return of the original symptoms showing considerable loss of weight and strength. The thyroid gland had not changed in size or consistency during the interim.

Exploratory operation was done at the site of the original laminectomy and the small bit of tissue removed showed microscopically only scar tissue and fat. The clinical diagnosis at this time was tumor of the spinal cord probably return malignancy. The patient died 2 months later.

At autopsy the bodies of the sixth and seventh cervical and the first thoracic vertebrae were filled with a soft reddish spongy vascular mass which was compressing the spinal cord in this region. The thyroid gland was but slightly enlarged firm and nodular with no definite infiltration to neighboring tissue. On section there were firm whitish areas which yielded abundant tissue juice on scraping. A few of the cervical lymph nodes and the thymus contained small nests of similar tissue. Microscopic study showed the whitish areas in the thyroid to be made up of a primary papilliferous adeno-

carcinoma probably originating in a papilliferous adenoma. The metastases to the vertebrae (Figs 1, 2 and 3) cervical nodes and thymus showed many similar carcinomatous areas but there were large areas which looked exactly like normal thyroid tissue with follicles of various sizes filled with homogeneous colloid and surrounded by a single layer of low cuboidal cells without mitoses or hyperchromatism or pluristratification or any other evidence of an abnormal growth tendency. The extraordinary variability in the histological appearance of the metastases is a constant finding in all of our autopsied cases of frank carcinoma of the thyroid and many authors have emphasized it notably Bell (3).

Certainly histological examination of such innocent appearing masses at the time of operation would have given as much evidence in favor of a benign metastasizing goiter as has obtained in many of the cases reported as such particularly in view of the apparent clinical innocence of the thyroid gland during the long period of observation. Yet the evidence of malignancy in this case is established beyond a doubt.

REPORT OF CASE WITH FEMORAL METASTASIS

A woman of 60 entered the surgery clinic for treatment of a femoral fracture which had occurred 6 months previously. All attempts to promote healing had been fruitless. For 4 months prior to the fracture she had experienced painful sensations in the left leg and thigh. One day while engaged in her household duties she fell to the floor without any apparent reason and upon attempting to arise discovered that she had sustained a spontaneous fracture of the left femur just above the knee.

Exploratory incision was done to ascertain the cause of the delayed healing. Considerable soft gelatinous reddish tissue was found between the fragments. This tissue seemed indistinguishable from that seen previously by the surgeon in cases of bone sarcoma so high thigh amputation was done.

Microscopic study of the tissue between the bone fragments revealed acini of varying size surrounded by a single layer of cuboidal cells and filled with homogeneous colloid. The nuclei showed neither hyperchromatism nor mitotic figures. Many of the acini were small and devoid of colloid having much the appearance of normal fetal thyroid tissue (Fig 4). There was little to suggest a rapidly proliferating malignant growth. Because of its innocent morphology it was thought to be a metastasis of normal thyroid tissue. The pathological report was received with great surprise and the surgeon's attention was directed toward the thyroid gland. A small goiter common to this district was found. The patient insisted that it had been there since girlhood and that it had actually diminished in size during the last few years. Clinically there was no evidence of malignancy.

This case was reported by de Nancrede in 1913 as a case of metastasis in the femur of normal fetal

into the cul de sac there is no true hernial sac and no ring or aperture through which the viscera herniate. The uterus descends because of stretched and attenuated cardinal and uterosacral ligaments the cul de sac is enlarged and there is really a descent of the floor of the pelvis. This condition is properly termed *elytrocele* or vaginal enterocele. It goes without saying that complete rupture whether traumatic or operative, with exposure of the bowels is not a hernia.

Numerous case reports were found in the literature described as vaginal hernia but few of the writers gave a clear description of the relations of the parts and the location of the hernial ring merely stating that a vaginal hernia was present. Such cases were not considered as proved vaginal hernia and were rejected. But three cases observed clinically without operation or autopsy are considered in this report although some of the cases rejected were probably genuine.

CASE 1 Taylor (11) Patient age 22 3 days post partum felt something give way within her that produced a sense of fullness in the upper vagina. Examination 10 months after the onset of the tumor was refused and the symptoms were ascribed to prolapse of the uterus. A pessary was advised but did no good. During a subsequent pregnancy 3 months later the mass increased in size. It could be reduced spontaneously. Following the second delivery the tumor mass increased in size and on examination there was found a tumor as large as a middle sized oval pessary occupying the posterior commissure of the labia below their external surface. Tracing it up to the right sacro-iliac symphysis or an intermediate point between that and the mesial line I discovered its surface to be smooth and continuous with the vaginal mucous membrane its bulk diminishing at the slightest touch.

The accurate description and careful observation indicate that this is a true pelvic hernia of the posterior vaginal variety. The hernial ring was very evidently mesial to the uterosacral ligament and the hernial canal followed the posterior vaginal wall and appeared as a mass in the midline in the posterior commissure.

CASE 2 Ith ridge (4) The patient is 10 or 20 years of age a 1b 5 1 child 11 months old. When she was about 6 months pregnant she jumped the rope one day and after that she felt something come down through the vagina. She went to full term and had a normal delivery. Whenever she lifts or strains the enterocele comes down presses the vulva apart and comes out between the thighs. On examination I found quite a large opening in the roof of the vagina. The edges of the ring can be very well outlined with the finger and when the hernia is down in the

vagina the finger in the vagina is at once attracted by a pendant mass and by pressing it a little one can determine that it is filled with gas. The opening comes down to the left of the uterus anterior to the broad ligament and posterior to the bladder.

The fact that this hernia descended into the vagina and not lateral to the vaginal canal differentiates it from a pudendal hernia. There was also a definite hernial ring present. This case falls into the classification of pelvic hernia anterior vaginal variety.

CASE 3 Barker (1) The patient 32 years of age in her third pregnancy felt and shortly afterward discovered a mass protruding in the vagina. She had all the symptoms of strangulation of a loop of intestine and on examination a soft mass about the size and shape of a glove finger was found in the vagina with a definite ring in the vaginal vault posterior to the cervix and a little to the right of the midline the ring was about 1 1/2 inches in diameter. The mass was easily reduced. This case was carefully studied as she was observed during eight successive attacks.

Only one case described as vaginal hernia has ever been reported at autopsy. The more regrettable then that the description is so meager as to leave us in doubt as to the exact location. This case was reported by Birchenall (2).

CASE 4 A woman 63 years of age died in 18 hours following an intra abdominal injury received while at play. Autopsy was permitted. The husband informed me that his late wife had long been the subject of what I inferred to be a vaginal hernia but as it had caused her no particular inconvenience she would not allow him to speak of it even to myself. The viscera of the abdominal cavity were all healthy except the ilium upon which there was a diffusely bright carlet patch indicating recent acute inflammatory action. Here on careful examination I detected a minute orifice. The hernia was indeed in the vagina but it slipped back readily before the point of the finger.

The size location and direction of the hernia are not stated. I quote this only to show the paucity of the literature on this subject.

The case previously referred to that of Thomas (12) is of especial interest because it is the first case of vaginal hernia operated upon because of the location of the hernial ring and the presence of a fibroid tumor which was evidently the cause of the hernia as in the case of perineal hernia reported by Moschcowitz (9).

CASE 5 The patient was a multipara 39 years of age. For 6 years there had been present a mass in the vagina which had increased in size until it protruded from the vagina and hung down to the middle of the thigh on the right side. It could be reduced but when in position caused severe pain in the bladder and rectum.

The thyroid showed neither general nor local enlargement. On section of the right lobe three filbert sized nodules appeared. Microscopically two nodules show irregular arrangement of cells change in shape absence of colloid and embryonic character of blood spaces all surging malignant adenoma.

CASE 4. Bontsch Osmolowsky (4) In a woman aged 53 a rapidly growing firm painless tumor developed in the right frontal bone 4 to 6 weeks after a blow received 6 months previously. It reached hazel nut size. Extirpation had to be done in two stages because of severe hemorrhage. A pulsating grayish red tumor extended to the dura mater a portion of which was removed with the firmly adherent tumor. Microscopically there were variously sized acini filled with collid grouped in lobules separated by vascular connective tissue. There were no solid cell masses. It resembled ordinary thyroid gland. The patient was in excellent health 3 years later. The thyroid showed large thickening particularly the right lobe. There was no change during the 3 years after operation. *An microscopic examination and no autopsy was made.*

CASE 5. Carle (5) A woman aged 50 had a pulsating tumor in the sternal region. Extirpation was followed by tetany and death occurred 14 days after operation. Autopsy The sternal tumor gave the appearance of alveolar cancer. There were many small metastatic nodules in the lung with typical thyroid structure.

Goutier had been present for 25 years. *No microscopic examination was made.*

CASE 6. Coats (6) Woman aged 46. There was a soft distinctly pulsatile swelling over the external occipital protuberance of 2 years duration. It was painful and fluctuated markedly but averaged peacocks egg size. Death Autopsy Bone absorption (1 1/2 inches in diameter) had taken place in the region of the external occipital protuberance. The tumor was red and soft. Another tumor 3/4 inch in diameter involving the parietal bone both tables and diploe was firmly adherent to the brain with pressure on the brain. There was present a third tumor in the right parietal bone (3/4 inch in diameter) and two smaller areas nearby. Microscopically they were typical thyroid sarcoles. Sometimes the epithelium fills the sarcoles.

The patient had had goiter for 16 years the goiter being larger on the left. Inability to swallow or speak had gradually developed. At autopsy both lobes were found enlarged with much calcareous deposit. Microscopically it was similar to the skull showing changes common in endemic goiter.

CASE 7. Cohnheim (7) A woman aged 35 had multiple gelatinous metastases in the lungs and bronchial nodes. The second third and fourth lumbar vertebrae contained red raspberry like masses. The right femur and the left sacro iliac junction were similarly invaded. All showed the structure of colloid goiter with many follicles showing epithelial nests within the colloid.

Both lobes of the thyroid gland were enlarged especially the left. The left lobe showed two large nodules which in section presented the same structure as that of the nodules in the lungs bronchial nodes and bones. There was no infiltration of the surrounding tissues. The smaller of the two nodules had a small button like projection into a tributary of the inferior thyroid vein which was histologically similar to the metastatic nodules.

CASE 8. de Crigns (8) A man aged 55 about a half year before examination noticed a pulsating tumor in the right gluteal region. He had previously felt intense pain in the upper right thigh radiating to the calf and foot. The right pelvic bone was swollen to the size of two fists not circumscribed soft strong pulsation. Diagnosis

aneurism of superior gluteal artery. At operation a very vascular tumor was removed with the curette. Death occurred 3 hours after operation. Autopsy Microscopically the tissue showed closely placed caecities of different size surrounded by a single row of cubical epithelium with large round nuclei filled with homogeneous colloid. There were dense connective tissue septa and infiltration and absorption of bone.

The patient had a small palpable goiter but no enlarged regional lymph glands. At autopsy the thyroid was not much enlarged. In the upper right lobe was a cherry sized brownish nodule. In the middle of the right lobe was a pea sized encapsulated light yellow nodule. In the left lobe was a round nut sized encapsulated nodule. Microscopically the left thyroid nodule showed regularly placed variously sized vesicles created with small cubical cells and filled with homogeneous colloid. The nodule was encapsulated. No infiltration was present. The smaller right pea sized nodule contained cells of medium size containing very little protoplasm large round nuclei some mitotic figures cells deposited in solid strands and heaps radiating irregularly. A few small follicles were filled with colloid. The capsule was infiltrated by tumor cells. A diagnosis of adenocarcinoma was made.

CASE 9. Crane (9) A woman aged 73 for 3 1/2 years had had a swelling and pain in the left shoulder. Ten years previously she had sustained a fracture of the left humerus without healing. She was emaciated. During resection a tumor was found which reached the vascularous plexus. The humerus fractured during manipulation. Healing occurred. In the fist sized tumor (6 by 6 centimeters) of the upper shaft of the humerus could be seen grossly colloid containing follicles. Microscopically it was encapsulated by a cellular vascular connective tissue. There was no infiltration of the capsule. It was for the greater part a benign colloid goiter with areas of old and fresh hemorrhage. There were areas of smaller follicles with less colloid and cylindrical epithelium (goiter parenchyma) and many strands of epithelial cells simulating adenocarcinoma.

The patient had had an enlarged thyroid for many years but no recent accelerated growth. She gave no complaints. The goiter nodule was hard and nodule. There were no signs of compression, and no recurrent nerve paralysis. Clinically it was a benign goiter. The goiter showed no change during the year following operation. *No autopsy and no microscopic examination was made.*

CASE 10. Dercum (10) A woman aged 56 one year following partial thyroidectomy had shooting pains and progressive wasting of the left upper extremity. Later there were pains in the right hip followed by gradual contracture of the right lower extremity. The left lower extremity was ultimately similarly affected. Then the right upper extremity showed wasting with severe pain. There was marked kyphosis in the dorsal and lumbar region. There was a tumor at the sternal end of the left clavicle. The Biot reaction could be elicited on the right side. There were multiple areas of parasthesia and multiple trophic ulcers. Death Autopsy There were red fleshy gelatinous tumors of the sternum ribs eighth and ninth dorsal vertebrae sacrum second lumbar vertebra and skull. The spinal cord was flattened by a tumor of the fourth and fifth cervical vertebrae. Microscopically (only cord and cervical tumors were examined) all resembled typical structure of the thyroid alveoli lined by a single row of cubical epithelium and filled with characteristic colloid in tenal. Patient had had a goiter for many years. Part of thyroidectomy had been done 6 years ago for aphonia and dyspnea. Grossly the tissue was normal thyroid. *No microscopic examination was made.*

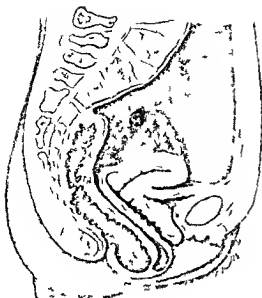


Fig. 1 Sagittal sectional diagram showing condition found at operation

toneal fluid could be seen and felt in the narrowed isthmus between the two tumor masses

On vaginal examination the cervix was found to be high in the pelvis and the uterus was anterior above the symphysis pubis an elastic mass was felt filling the lower abdomen. In the perineal region a large protruding mass was seen round smooth and covered by vaginal mucosa about 8 centimeters in diameter. A finger in the rectum detected the bulging anteriorly of the rectal wall into the tumor mass. No perineal body was present. Diagnosis was made of a large multilocular cyst of the ovary and rectocele. At operation on September 4, 1924 an ovarian cyst weighing with its contents 41 pounds was removed. There was much free peritoneal fluid and the intestines and peritoneum were covered with a gelatinous exudate. The uterus was small and high in the abdomen. The small intestines were not in the pelvic cavity and the mesentery was short and strong. The abdomen was closed in layers and the patient was in good condition. Unfortunately there was no suspicion in my mind at the time that the perineal mass was anything but a rectocele and the cul de sac was not explored. The patient's condition did not seem to warrant at that time the additional time under anæsthetic required for a perineoplasty.

Recovery was prompt and uneventful. Pathological diagnosis of the cyst was multilocular cystadenoma of the ovary. Before discharge from the hospital the patient requested me to operate on the rectocele.

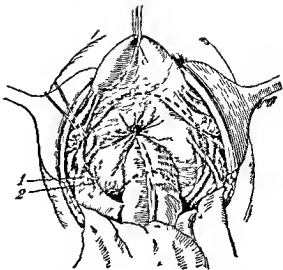


Fig. 2 Closure of cul de sac for pelvic hernia after Moschowitz

Operation September 30, 1924. With the patient in the lithotomy position a curved incision was made across the perineum along the muco cutaneous border. The vaginal mucosa was dissected upward from the protruding rectum for a distance of about 2 centimeters when a clear thin walled sac was encountered which contained fluid. This sac was carefully dissected free from the rectum and vaginal walls. It was 5 centimeters in width at the lowest point and gradually became narrower in the upper vagina. The vaginal mucosa was dissected up to the level of the cervix. The sac was freed to this point and after it was determined that it contained nothing but fluid the neck of the sac which was about 2 centimeters broad was transfixed and ligated with chromic gut. The opening of the hernia sac was in the midline at the most dependent point of the cul de sac. The space was obliterated by suturing the anterior rectal wall to the vaginal wall and the levator muscles were interposed and the perineoplasty was completed in the usual manner.

Union occurred by primary intention and the patient left the hospital in good condition. She lives in a village at a distance from Peking and cannot be traced.

CASE 11 Feng Wang Shih hospital No. 11,81 a Chinese woman 36 years of age V para was admitted to the hospital on September 18, 1925 with the complaint of great abdominal distention of 2 years duration and general oedema of the lower extremities cough for 2 months and a mass protruding from the vagina. Menstrual cycle has always been irregular the interval being 20 to 30 days and since November 1924 there has been complete amenorrhoea. Family history and past history were of no importance.

Physical examination showed a fairly well developed well nourished Chinese woman sitting up

Autopsy On the right side of the fifth dorsal vertebra and rib was a saucer sized tumor infiltrating the muscle which grossly resembled goster. It extended into the spinal canal and compressed the cord. In the first lumbar vertebra a tumor the size of a hazel nut extended into the spinal canal. In the right posterior thorax in the mid axillary line a tumor the size of a fist extended from the fourth to the sixth rib. The ribs were invaded and the tumor was continuous with the vertebral tumor. The fifth and sixth thoracic vertebrae were destroyed by the tumor. The gross pathological diagnosis was primary vertebral sarcoma. Microscopically the center showed large colloid filled follicles—areas suggesting parenchymatous goster but no areas suggesting carcinoma. The periphery showed many proliferating cell masses. There was much infiltration. The lumbar metastasis was similar.

The thyroid gland was slightly enlarged and grossly rich in colloid. In the right lower pole was a pea sized nodule with hyalinization and calcification similar to benign adenoma. Microscopically the thyroid nodule showed small solid follicles similar to fetal adenoma. There were no tumor thrombi. The capsule was intact and there was no lymph node invasion.

CASE 22 Gierke (22) A man aged 46 had stinging pains in the sacrum for 4 years. A clinical diagnosis of compression myelitis of 1½ years duration was made. At the level of the third dorsal vertebra kyphosis developed. In the first lumbar vertebra was a tumor the size of a fist of 2 years duration. Microscopically the picture was that of colloid goster with colloid more compact than in the previous case. From 3 to 5 milligrams of calcium iodide were found in 20 grams of tumor.

The thyroid gland presented a normal appearance. *No microscopic examination was made.*

CASE 23 Goebel (23) A woman aged 54 fell 2½ years previously and fractured the femur which healed with shortening. Three months later she fell again and the femur fractured spontaneously. No consolidation followed. At operation a mass was found in the bone which infiltrated the muscle. It was diagnosed sarcoma. Microscopically it was a thyroid adenoma with polymorphism of cell cords and solid epithelial nests. An area of thyroid metastasis was found in the bone marrow at a low level.

The patient had a goster of moderate size. *No microscopic examination and no autopsy was made.*

CASE 24 Guibé and Legueu (24) A woman aged 51 complained of pains in the right shoulder. A pulsatile tumor the size of a chicken's egg was in the outer third of the right clavicle. It was extirpated. Five months later there was no recurrence. Microscopically it simulated thyroid structure with abundant homogeneous material giving color reactions of colloid.

The thyroid gland showed no enlargement and no signs of malignancy. *No microscopic examination. No autopsy.*

CASE 25 Gussenbauer (25) reports the case of a woman with a soft and fluctuant mass in the region of the tenth eleventh and twelfth thoracic vertebrae. There were pains in the lower extremities and finally paraplegia. Kyphoscoliosis developed. Local recurrence followed operation. Microscopically it was a typical thyroid adenoma.

The thyroid gland was large particularly on the left. It was clinically benign. *No microscopic examination. No autopsy.*

CASE 26 Halbron (26) A woman aged 68 had a tumor of the sternum 8 by 10 centimeters with expansive pulsations synchronous with the radial pulse. A diagnosis was made of aneurysm of the ascending aorta. Death occurred 3 years after onset. *Autopsy.* There was no connection between the thyroid and sternal tumor. The

tumor involved the right sternoclavicular articulation and clavicle. Microscopically there were many vessels filled with colloid and surrounded by flattened cells. There were other areas of large irregular cells irregularly infiltrating neighboring tissues.

The patient had had a soft goster of fist size for 4 years. Microscopically it presented the classical aspect of benign goster throughout.

CASE 27 Halperine (27) A man aged 54 had a small tumor of the clavicle of 20 years duration. He was in good health. Following traumatism the clavicular tumor grew rapidly to the size of a small fist and was extirpated. Microscopically the structure was that of thyroid.

The patient had a goster which was larger on the right. *No microscopic examination. No autopsy.*

CASE 28 Harmer (28) In a woman 44 years of age, a tumor slightly larger than a nut appeared on the right side of the face 2½ years previously with no marked increase in size. She complained of headache and nasal obstruction and lid ptosis. There was decreased vision in the left eye then the right and bilateral optic atrophy. In front of the left ear was a hard reddish gray cherry sized movable tumor. On the right was a fist tumor reddish gray and soft. The right choana was filled with a polypoid mass. Extirpation was followed by recurrence. Microscopically there were masses of cubical and polymorphous epithelial cells arranged in solid surrounding colloid masses.

A goster slowly developed at the time the sphenoid tumor appeared and later rapidly increased to the size of a man's fist. There were palpable glands behind the thyroid. There were no difficulties in breathing or allowing resulting from the thyroid enlargement. *No microscopic examination. No autopsy.*

CASE 29 Howard (29) A woman 50 years of age had on the vertex of the skull a firm elastic orange tumor of 7 months duration. At the external border of the left scapula was a soft round smooth tumor 3 inches in diameter. There was a similar pulsating tumor of the left ilium. Anesthesia and paresthesia were present below the seventh rib. Death occurred 1 year after the onset of symptoms. *Autopsy.* The cranial tumor rested on the dura. On the posterior surface of the seventh cervical vertebra a similar growth projected into the canal and exerted pressure on the spinal cord. Metastases were found in the liver spleen and kidney and all showed at least many were filled with colloid and were covered by a single layer of cubical cells resembling normal elements of thyroid gland.

The thyroid gland had recently enlarged after 21 years of quiescence. At autopsy a firm tumor was found compressing the trachea which resembled ordinary goster.

CASE 30 Heilberg (30) In a woman 51 years of age a tumor the size of a hazel nut had appeared in the manubrium sterni 17 years previously. It was noticeable long before the thyroid enlargement appeared. Seven years previously it had reached the size of an apple with clearly pulsations and was compressible. A diagnosis was made of aortic aneurysm. For 3 years she had had pains in the back and sacrum terminating in weakness and stiffness of both legs and urinary and fecal incontinence. While she was lying in bed the upper right femur had fractured spontaneously. A fusiform swelling appeared at the point of union of continuity. The sternal tumor reached fist size. She died of ascending infection of the urinary tract. *Autopsy.* The sternal tumor resembled grossly the gosterous thyroid. A tumor the size of a dove's egg was found in the seventh thoracic vertebra compressing the spinal cord. In the region of the pathological fracture was a raspberry jelly

The muscles forming the levator ani group are interrupted in their perfect closure of the pelvic outlet by the rectum the vagina and the urethra. That herniæ do not more often occur in the midline between these tubular structures is very remarkable. The fusion between the rectum and vagina is not dense and their more frequent separation by the stretching of the peritoneum of the cul de sac would be expected. That it does not occur is probably due to three factors: the sigmoid colon is a thick walled tube and because of its length is coiled over the weak spot in the bottom of the cul de sac supported by the uterosacral ligaments; the mesentery of the small bowels gives enough support to prevent undue pressure of these organs in the cul de sac; the normal inclination of the pelvis throws the weight of the abdominal contents on the anterior abdominal wall and the bony structures forming the anterior part of the pelvis.

ETIOLOGY

There is of course the same possibility that in common with other herniæ these herniæ may be either congenital or acquired. Failure of fusion between the rectum and vagina might occur leaving a weak spot into which the peritoneum of the cul de sac might be stretched under conditions of abdominal pressure or there might even be a congenital peritoneum lined space between the rectum and vagina. More probably trauma is the direct etiological factor as all the patients reported but one were parous and had undergone the strain of pregnancy and labors. Repeated labor undoubtedly loosens the connective tissue attachments of the uterus and vagina. This together with abdominal or intra abdominal conditions such as ptosis of the viscera or increased intra abdominal pressure due to tumors or accumulations of fluid causes the deepening of the cul de sac and a hernia to develop.

Herniæ between the rectum and vagina usually develop gradually. Of the cases studied only 2 appeared suddenly and there were signs of strangulation in only 1. Of the anterior vaginal herniæ 1 appeared suddenly and 1 gradually and neither showed signs of strangulation of hernial contents.

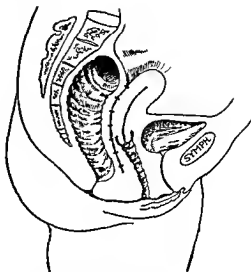


Fig. 3. Closure of cul-de sac for pelvic hernia completed (After Moschowitz)

SYMPTOMS

Since the usual course of development is gradual the symptoms are mild. Incapacitation for work is caused by the inconvenience of the protruding mass and not as a rule on account of pain. Bladder and bowel disturbance may be noted. Symptoms are more marked in the anterior variety than in the posterior. Only 1 case (Barker) of the posterior variety showed signs of strangulation.

DIAGNOSIS

Patients who come to the physician because a mass protrudes from the vagina are *a priori* considered to be suffering from rectocele and this constitutes the chief difficulty in diagnosis. Of the 6 patients operated upon the diagnosis of vaginal hernia was made before operation only twice (Sweetser Miles) and in 3 of those operated upon the diagnosis was not arrived at during the first operation though the prompt recurrence of the vaginal mass after operation would indicate that the hernia was present at the time of operation. Another difficulty arises from the fact that the internal ring is large and that these herniæ disappear in the recumbent or lithotomy position. This latter point is one of the most important in diagnosis that is the presence of a mass in the

nodule was tumor vertebræ dorsalis (metastasis strumæ benignæ) cum compressione medullæ spinalis. Laminectomy was done. Microscopically epithelial proliferation was associated with areas of colloid and atypical gland cells—more malignant than the extirpated goiter nodule.

Thirteen years previously a goiter the size of a fist was removed surgically. The thyroid now contained a walnut sized hard nodule which was extirpated. Microscopically it was a follicular goiter with rich proliferation of follicles partly with solid strand formation. Colloid was scant and there were many atypical cells. *No microscopic examination was made of tissue from the first operation. No autopsy.*

CASE 41. Jaeger (41). In a woman 69 years of age following a fall a tumor developed in the sixth and seventh cervical and first thoracic vertebræ. Another tumor involved the third and fourth lumbar vertebræ. At operation on the lumbar tumor there was profuse hemorrhage. Microscopically the structure was that of benign adenoma. The patient had had a freely movable goiter for 10 years. *No microscopic examination. No autopsy.*

CASE 42. Jeffries (42) reports the case of a parietal subdural tumor composed of somewhat embryonal thyroid tissue.

The thyroid gland appeared to be entirely normal. *No microscopic examination. No autopsy.*

CASE 43. Joll (43). A woman 47 years of age had pain and weakness in the left arm and a tumor of the sternal end of the left clavicle. Healing followed extirpation. Microscopically appearance of innocent goiter; the vesicles are of regular shape and most of them contain colloid.

The thyroid gland had escaped attention until the nature of the clavicular tumor was discovered. There was a small firm freely movable tumor of the right lobe. *No microscopic examination. No autopsy.*

CASE 44. Kanoky (44). In a woman 40 years of age a tumor the size of a hazel nut had appeared 3 years previously on the left side of the head. Three months later it had reached 2 inch in diameter. Attempted surgical removal resulted in profuse hemorrhage. The tumor was not removed. The growth gradually increased for 2 years without symptoms then pain, nausea, vomiting, epistaxis and transient paralysis of the left arm and leg developed. There was marked left exophthalmos with blindness. The left common carotid artery was ligated. The pulsations stopped and the tumor diminished in size. There was complete right sided hemiplegia 6 hours after operation with death 36 hours after operation. Postmortem a tumor 5 by 3 by 2 1/2 inches was removed. The bone was completely absorbed and the tumor extended to the dura. Microscopically it was like thyroid microscopically structurally identical with normal thyroid tissue. *No trace of malignancy.*

An enlargement of the right side of the neck began 20 years previously. It grew to large size during the next 10 years and was treated with injection (phenol and iodine?). Two years later the right lobe was extirpated (intrathoracically). *No microscopic examination. No general autopsy.*

CASE 45. Knapp (45). A man 66 years of age complained of vertigo and diplopia. There was a pulsating soft tumor within the right upper orbital margin about 3 inch in diameter. At operation it was found to extend to the dura. Microscopically it was (Ewing) adenoma of aberrant thyroid tissue. There was a recurrence, a tumor 5 centimeters in diameter in the right scapula. The x-ray showed multiple nodules in the lungs and destructive processes in the eighth rib and pelvis. He died 3 1/2 years after onset.

The thyroid gland seemed entirely normal. Later a circumscribed firm tumor appeared in the lower left lobe

(4 centimeters in diameter). *No microscopic examination. No autopsy.*

CASE 46. Kolb (46). A woman 75 years of age had a small tumor in the left parietal region which had elapsed 6 years after the extirpation of the goiter. It was a progressive growth vascular simulating hemangioma. There were no pulsations and no bruit. The clinical and radiological diagnosis was sarcoma. At extirpation it was found to extend to the dura a portion of which was removed with the adherent tumor. Death followed operation. Autopsy. There was a defect in the skull the size of a saucer. There were a few whitish pea sized nodules in the lungs. Microscopically the nodules in the lungs showed typical goiter structure. The parietal tumor was of the same architecture as the thyroid.

A goiter had been removed 7 years previously. It was normal in size at the time of autopsy, the right side being somewhat larger. Microscopically there were large follicles with no malignant changes.

CASE 47. Krasko (47). In a woman 53 years of age a small vascular tumor of the forehead appeared 6 weeks following trauma and extended through the frontal bone to the dura. It was removed at operation and there was no recurrence during 3 years. Microscopically it was normal thyroid tissue.

A large goiter remained unchanged during the 3 years following operation. *No microscopic examination. No autopsy.*

CASE 48. Langhans (48). Male 58 years of age. Autopsy. There were thyroid nodules and metastases of similar appearance in bronchial mediastinal and retroperitoneal lymph nodes lungs kidneys vertebræ sternum and ribs. The metastases in the lymph nodes showed the same histological structure as the thyroid nodules colloid masses surrounded by cubical and sometimes cylindrical epithelium. Lung and pleura and kidney nodules showed the same structure.

There was a small cyst of the right thyroid lobe filled with hemorrhagic colloid fluid with several small nodules in the slightly enlarged left lobe. Microscopically the nodules contained vesicles of various sizes and forms the smaller ones surrounded by cubical epithelium and usually empty while the larger ones contained a pale colloid. The thickness of the epithelium pointed to a relatively recent enlargement which presented the picture of colloid goiter.

CASE 49. Langhans (49). Autopsy on a woman 6 years of age revealed an anterior mediastinal node enlarged to a 3 centimeters in diameter hard grayish white and grayish red fairly transparent. There were many similar nodules in the lungs bronchial glands and choroid plexus. There was complete metastatic normal thyroid tissue in many of the secondary nodules. All showed structure of simple benign goiter. Some small vesicles without lumen or colloid appeared as solid cell heaps. There was no tumor thrombosis or infiltration of the stroma. In one lymph gland were differently formed solid cell nests of carcinomatous appearance. Numerous lung nodules were more carcinomatous with solid cell strands and nest together with numerous vesicles of 200 μ diameter simulating normal thyroid vesicles. The choroid plexus nodules were similar to those in the lungs.

Both lobes of the thyroid gland were enlarged each containing several colloid nodules showing calcification. Glandularly it was a simple goiter. Microscopically large and small vesicles were found filled with thin cell filled strands and nest together with numerous vesicles of 200 μ diameter simulating normal thyroid vesicles.

CASE 50. Lettice and Mason (50). A man 67 years of age had had scapula for 7 years. A tumor the size of a adult fist in the left costal region extended from the ninth rib to the diaphragm and into the pleural cavity

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THREE CASES OF THYROID METASTASIS TO BONES

WITH A DISCUSSION AS TO THE EXISTENCE OF THE SO CALLED BENIGN METASTASIZING GOITER ¹

By WALTER M. SIMPSON, M.S., M.D., ANN ARBOR, MICHIGAN

S. I. Doctor P. H. 123 U. W. M. 58

THREE cases of osseous metastasis of thyroid tissue are herewith reported. At the time of admission to the University of Michigan Hospital the three patients presented a symptomatology which directed the clinicians' attention chiefly to the bone tumors. The first was a case in which spontaneous fracture of the femur occurred as a result of the presence of a tumor composed of histologically benign thyroid tissue. A small goiter gave no evidence of malignancy. In the second case the metastasis was to the astragalus. Again the microscopical picture was that of typical thyroid tissue and the patient possessed a small symmetrical goiter which was regarded as clinically benign. The third patient presented signs of vertebral neoplasm with compression myelitis but with no clinical signs which might direct suspicion to the thyroid gland. Laminectomy exposed a hazel nut sized tumor in the sixth cervical vertebra which on microscopical examination contained areas of typical thyroid tissue.

All these patients later developed unmistakable clinical evidence of malignancy of the thyroid gland and all died within a year and a half following operation. One case came to autopsy.

BENIGN METASTASIZING GOITER

The bizarre character of primary and secondary neoplasms of the thyroid gland has long intrigued the interest of the pathologist and the surgeon. The alleged failure of

these new growths to conform to the generally accepted doctrines of neoplasia has led to widely divergent conceptions of their origin and manner of growth. The mysteries surrounding the physiology of the thyroid gland have been shared by its obscure pathology.

One outstanding incongruity concerns itself with the so called benign metastasizing goiters. In almost every instance those who have reported these cases have been struck by the paradox of simple goiters and benign thyroid adenomata with multiple metastases. Such an assumption is at once in direct contradiction of one of the most firmly established doctrines concerned with the biology of malignant new growths. The development of multiple metastases has long been considered *prima facie* evidence of malignancy. The statement that metastases of thyroid tissue do not conform to this fundamental rule at once places a heavy burden of proof on those who suggest such a possibility. As recently as 1923 Joll (43), in the course of a Hunterian Lecture before the Royal College of Surgeons declared that the thyroid gland may be quite normal in every way and the metastasis may have either the structure of normal thyroid tissue of an innocent thyroid tumor or of a tumor exhibiting any degree of malignancy. One purpose of this paper is to weigh the evidence as it appears in the literature for or against the existence of such an entity and to prove that there is no basis for the belief that thyroid gland tissue behaves

One half year later (June 1901) there was a recurrence the size of a chicken's egg in the left frontal bone. Simultaneously, there appeared an apple sized tumor in the right temporal bone and a walnut sized tumor at the right sternoclavicular junction. The patient was markedly emaciated. Death followed the removal of the temporal metastasis. Incomplete autopsy (upper sternum, left clavicle, trachea, thyroid gland and frontal recurrence) showed microscopically a recurrence and the sternoclavicular nodule showed normal thyroid tissue.

The right lobe of the thyroid gland became enlarged as the recurrence and temporal tumor appeared. On section of the right thyroid a spherical nodule was found encapsulated. This nodule was recognized as the primary tumor anatomically. Histologically it resembled thyroid tissue. *No complete autopsy.*

CASE 59. Iatel (59). A woman, 63 years of age had a tumor of the left frontal bone (orbital margin) of 4 months duration. It was expansive, synchronous with the pulse. At extirpation it was found to rest on the meninges and to perforate completely the frontal bone. Microscopically there were areas reproducing normal thyroid and other areas showing the character of a thyroid carcinoma of high malignancy. There was a recurrence 8 months later.

For 30 years there had been a tumefaction of the thyroid gland with no recent augmented growth and no signs of malignancy. The tumor was uniformly hard, mobile and painless. No histological examination was made and no autopsy performed.

CASE 60. Porcile (60). A woman, 46 years of age had a slowly developing tumor involving the inner third of the clavicle, sternoclavicular articulation and manubrium sterni with pains in the left arm. Extirpation revealed a grossly irregular, spherical mass with a firm gray peripheral zone and a soft central zone. Microscopically follicles were surrounded by cubical and columnar cells and contained homogeneous colloid. Some areas showed the structure of adenoma others were carcinomatous. Paraplegia was followed by death. There was a metastasis also to the seventh dorsal vertebra.

In the thyroid gland was a walnut sized tumor firm, painless, not adherent to the skin. The patient experienced no difficulties in respiration or deglutition. No microscopic examination was made and no autopsy performed.

CASE 61. Foser (61). A woman, 47 years of age, soon after thyroidectomy 6 years before examination developed weakness of the left leg followed by paræsthesia. There was a feeling of pressure in the abdomen with pains in the right leg. A soft irregular swelling appeared at the right posterior iliac spine. At operation a soft grayish red tissue was found extending from the lumbar vertebrae. Paræsthesia disappeared only to reappear a few days later. Six months later a hand size pulsating tumor appeared in the sacral region with rapid recent growth. The patient was bedridden and cachectic. Microscopically, the lumbar tumor showed long parallel strands with colloid deposit and large vesicles filled with colloid and surrounded by flattened epithelial cells.

Twenty years previously a small goiter had developed and had remained uniform for 14 years after which it grew rapidly and caused marked difficulty in swallowing. At operation all of it was removed except a portion of the left lobe. Microscopically it was a porenchymatous colloid goiter. At the time the case was reported the thyroid contained a nodule the size of a walnut in the midline with no fixation to the skin or the underlying tissues.

CASE 62. Radley and Duggan (62). The patient was a man, 46 years of age. A small nodule had appeared in the right clavicle 6 months previously and grew to orange size

was smooth tense and showed visible pulsations. A reddish brown vascular soft tumor was excised. Histologically it was a secondary thyroid carcinoma with both solid and tubular acini. Tests for iodine were negative.

Two years before a small adenoma had been shed out of the thyroid isthmus. It was normal in size, consistency and mobility with no evidence of malignancy. *No histological examination. No autopsy.*

CASE 63. Regensburger (63). A woman, 55 years of age had had a painful swelling in the left upper arm 2 years previously which had gradually increased to the size of a man's fist. In the infraclavicular fossa were 2 hard glands of hazel nut size. The patient showed marked cachexia. A diagnosis of sarcoma was made. The upper third of the humerus was resected and the infraclavicular glands removed. Healing resulted. The tumor of the humerus 9 by 6 centimeters infiltrated the bone internally. The lymph nodes were replaced by whitish growth. Microscopical examination showed bone tumor and lymph gland. There were large epithelial cell masses some forming longitudinal rows. Many acini showed typical thyroid structure. Many papillae were covered with large cylindrical cells. The lymph nodes were similar. Chemical analysis showed no iodine.

In the middle lobe of the thyroid was a hard tumor the size of a prune. *No microscopic examination. No autopsy.*

CASE 64. Reinhardt (64). A woman, 57 years of age for 6 months had had pains in the right scapula radiating to the left arm. Later sudden paralysis of the lower extremities appeared. Laminectomy of the second to the fourth thoracic vertebrae was done. On both sides of the midline were hazel nut sized tumors of the vertebrae. Extirpation resulted in death during operation. Microscopically the tissue was simple benign parenchymatous goiter.

The patient had a large goiter with no growth for years. Clinically it was non-malignant. *No microscopic examination. No autopsy.*

CASE 65. Riedel (65). The patient was a woman, 40 years of age. Thyroid tissue was removed from the jaw with recurrence 10 years later.

There was no growth of the thyroid gland at the time of operation or during the 10-year interval. *No microscopic examination. No autopsy.*

CASE 66. Riedel and Haackel (66). A woman, aged 48 had a deep-seated rapidly developing tumor mass in the midline of the maxilla. Hemisection of the jaw was done. Microscopically the tissue was typical thyroid. There was no recurrence 4 years later.

The patient had a large goiter at the same time which had been present for 20 years. *No microscopic examination. No autopsy.*

CASE 67. Runge (67). A woman, 41 years of age, 34 years before had felt a sudden cracking in the back of the neck accompanied by stinging pain. Rotation was limited the head fell to one side and flexion and extension were later limited. Active motion of the head was impossible. Simultaneously the right arm and leg became paralyzed. Later the left arm became paralyzed. A diagnosis was made of compress on myelitis due to caries or tumor of the epistropheus. The patient died in the 5th month of pregnancy. Successful post-mortem and cranial section was done. *Autopsy.* There was a reddish tumor of the occiput around the foramen magnum, atlas and epistropheus. The main mass in the spinal canal originated in the epistropheus and infiltrated the muscle. Microscopically (on Recklinghausen) nests and strands of cells were spherically disposed in alveoli. Many were colloid containing with a single layer of flattened cells as in thyroid gland. (This was regarded by Cohnheim as similar to his case.)



Fig 3 Photomicrograph showing metastatic papillary adenocarcinoma of thyroid origin in body of seventh cervical vertebra

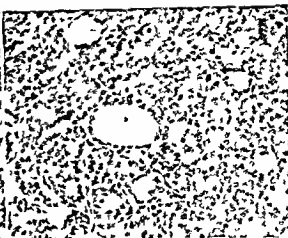


Fig 4 High power view of thyroid metastasis to femur showing well-defined colloid-containing acini and smaller acini of the fetal type devoid of colloid

by their almost invariable reference to this first recorded case. A resume of many of these cases will be found at the end of this paper. A search of the literature reveals 77 cases of so called metastasizing goiter. Many of these cases were discovered in reports in which the title gave little hint of their content and it is quite probable that there are many other similar cases with their identity hidden by irrelevant titles.

Four years after Cohnheim's report Morris (55) told of a somewhat similar case in the Transactions of the Pathological Society of London (1880). The inadequate study of this case with no examination of the thyroid gland and a very limited autopsy leads only to the conviction that no accurate conclusions can be drawn from such cursory examination. Nevertheless this paper marked the beginning of a long series of similar English case reports.

ECTOPIC ANLAGEN THYROID

Honsell (36) made a spirited defense of Cohnheim's theories. He discussed at length the possibility that the metastases might represent displaced thyroid anlagen particularly as in his case the thyroid tissue in the frontal bone first appeared at puberty. This last factor has no significance because practically every other case reported occurred in late adult life. It is now quite firmly estab-

lished by careful embryological studies that even though aberrant thyroid tissue is a common developmental anomaly it is always found in the immediate neighborhood of its primitive origin the median derivative from the thyroglossal duct and the lateral paired derivatives from the ventral borders of the fourth pharyngeal pouches. Accessory thyroid masses may therefore be found anywhere from the foramen cæcum of the tongue to the arch of the aorta in the median line as derivatives of the thyroglossal duct or lateral aberrant masses may be found as remnants of the branchial cleft derivatives usually about the middle of a line from the mid clavicle to the tip of the mastoid process. Adenomatous cystic and carcinomatous degeneration of these detached islands of thyroid tissue is not at all uncommon. Rossténcher (78) found in the literature over 100 cases in which a tumor of the posterior one-third of the tongue proved to be thyroid gland. He emphasizes the frequency with which operative removal is followed by grave symptoms of myxedema and tetany (9 to 22 per cent) indicating that all of the thyroid tissue and possibly parathyroid also may have come to lie in the tongue. Tyler (79) and Ashhurst and White (80) have reported instances of primary carcinoma of lingual thyroid the former with extensive metastasis. Primary malignancy of lateral

One half year later (June 1901) there was a recurrence the size of a chicken's egg in the left frontal bone. Simultaneously there appeared an apple sized tumor in the right temporal bone and a walnut sized tumor at the right sternoclavicular junction. The patient was markedly emaciated. Death followed the removal of the temporal metastasis. Incomplete autopsy (upper sternum, left clavicle, trachea, thyroid gland and frontal recurrence) showed microscopically a recurrence and the sternoclavicular nodule showed normal thyroid tissue.

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have been made 'atypical cell forms' "solid round or filiform islands of epithelium characteristic of rapidly proliferating cells' "cells with numerous mitotic figures 'polymorphism of cell cords' are variously described. Such statements create considerable doubt as to the benignity of the cells so described.

In most cases the report was published shortly after the discovery of the benign microscopic appearance of the metastases. The writers were apparently satisfied with the knowledge that the thyroid gland showed no external evidence of malignancy, and made little or no attempt to learn of the ultimate outcome. Such a course is unwise because of the extremely slow growth of most thyroid carcinomata and it is quite probable that if the ultimate cause of death could be determined in these cases they would show a high proportion of deaths from unquestionable carcinoma of the thyroid. The experience of Alamartine and Jaboulay (1a) is a case in point. In 1908 they told of a woman of twenty three years who had possessed a tangerine sized goiter for two and one half years. An orange sized pulsatile tumor developed at the upper end of the humerus which was diagnosed aneurysmal sarcoma. On auscultation *bruit* was heard. During this time the goiter remained without modification of size or consistency. Resection of the upper portion of the humerus was done and the microscopic examination of the tumor showed typical thyroid tissue. The thyroid gland was not examined microscopically and on the strength of the clinical benignity of the thyroid tumor and the innocent microscopic appearance of the metastatic tumor it was thought to be a case of benign metastasizing goiter.

In 1911 Alamartine and Bonnet (1b) rendered a further report on the same case and told of the later development of multiple metastases in the right femur (with spontaneous fracture) and to the vertebrae followed by death.

Further proof of this tendency to report such cases prematurely is to be found in the first and second reports of a case by Oderfeld and Steinhilber (58). In 1901 under the

title "*Zur Casuistik der Knochenmetastasen von normalem Schilddruesengewebe*" they told of a woman of 58 with an egg sized elastic tumor replacing the left frontal bone. It had attained this size in 3 months. It was diagnosed as sarcoma and extirpated. The tumor was exceedingly vascular and extended to the dura mater. The convalescence was uneventful and when the patient was seen a half year later there was no recurrence and she was in excellent health. Microscopically, the tumor was made up of normal appearing thyroid tissue. There were no enlargement of the thyroid gland and no palpable accessory thyroids.

In 1903 the second report (58) appeared. The situation had changed remarkably. Six months following the last examination mentioned in the previous paper the patient was markedly emaciated and showed a chicken egg sized recurrence in the left frontal bone. The right thyroid lobe had undergone considerable enlargement simultaneously there appeared a tumor in the right temporal bone which grew to the size of an apple. A walnut sized tumor was found at the right sternoclavicular articulation. Death followed the surgical removal of the temporal metastasis. Complete autopsy was not permitted but the upper sternum, clavicle, trachea and thyroid and the frontal recurrence were removed postmortem. The sternoclavicular nodule and recurrence showed the same microscopic picture as previously—normal thyroid tissue. An encapsulated spherical nodule in the right thyroid lobe was recognized as the primary tumor.

Much stress has been laid upon the microscopic appearance of the secondary deposits. In a large measure the tendency to consider this whole group as benign has arisen from the fact that the metastases frequently look much like normal thyroid tissue or that they simulate benign thyroid adenomata. There is abundant evidence to indicate that a metastatic area of thyroid adenocarcinoma may indeed assume the appearance of typical thyroid tissue. Ewing (96) says "The natural tendency of the metastatic thyroid cells to develop into normal thyroid tissue may progressively alter the structure of a secondary

abundant evidence of primary carcinoma of the thyroid gland

3 In Morris's case there was no examination of the thyroid gland

4 In most of the collected cases the diagnosis of 'benign metastasizing goiter' was based upon the clinically benign appearance of the goiter and upon the benign microscopic appearance of extirpated metastases

5 Metastases of thyroid carcinomata are subject to great variability in microscopic appearance and may assume the structure of normal thyroid tissue, benign thyroid adenoma or simple colloid goiter. Such secondary growths may function as does normal thyroid tissue

6 In but 29 of the 77 similar cases which have been collected from the literature was there microscopic examination of the thyroid gland and in many of these were described areas of undoubted carcinoma. Autopsy was done in but 33 per cent of the previously reported cases

7 The belief of some writers that these distant metastases represent aberrant thyroid tissue has no basis in fact

8 The metastases in the cases of so called benign metastasizing goiters show the same striking predilection for bone that characterizes secondary growths of thyroid origin which show frank carcinomatous structure. The vertebral bodies and the cranial bones are most frequently involved. Pathological fractures of the humerus and femur are common. The osseous metastases frequently show fluctuations in size during menstruation and pregnancy. Pulsation is likewise a common finding

9 Most of the thyroid metastases to bone were diagnosed clinically and roentgenographically as primary sarcomata. Metastatic new growth of thyroid prostate breast adrenal or renal origin should be considered in cases of skeletal new growth

10 In most instances the authors published the case reports shortly after they discovered the innocent microscopic appearance of the metastases without waiting to learn of the outcome

11 Two cases from the University of Michigan Hospital showed osseous metastases

of microscopically benign thyroid tissue, associated with clinically negative goiters. One of the cases was reported soon after operation as an instance of metastasis of normal fetal thyroid tissue. Both patients subsequently showed clinical evidence of undoubted carcinoma of the thyroid gland and died within 18 months and 2 years respectively

12 Many cases are recorded in which the microscopical examination of tissue from the metastasis revealed normal thyroid structure while histological study of tissue from the thyroid gland showed areas of undoubted carcinoma

13 There is an abundance of evidence to indicate that there is no such entity as the benign metastasizing goiter and that the use of this confusing term should be abandoned

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have been made 'atypical cell forms' 'solid round or filiform islands of epithelium characteristic of rapidly proliferating cells' 'cells with numerous mitotic figures' 'polymorphism of cell cords' are variously described. Such statements create considerable doubt as to the benignity of the cells so described.

In most cases the report was published shortly after the discovery of the benign microscopic appearance of the metastases. The writers were apparently satisfied with the knowledge that the thyroid gland showed no external evidence of malignancy and made little or no attempt to learn of the ultimate outcome. Such a course is unwise because of the extremely slow growth of most thyroid carcinomata and it is quite probable that if the ultimate cause of death could be determined in these cases they would show a high proportion of deaths from unquestionable carcinoma of the thyroid. The experience of Alamartine and Jaboulay (1a) is a case in point. In 1908 they told of a woman of twenty three years who had possessed a tangerine sized goiter for two and one half years. An orange sized pulsatile tumor developed at the upper end of the humerus which was diagnosed aneurysmal sarcoma. On auscultation *bruit* was heard. During this time the goiter remained without modification of size or consistency. Resection of the upper portion of the humerus was done and the microscopic examination of the tumor showed typical thyroid tissue. The thyroid gland was not examined microscopically and on the strength of the clinical benignity of the thyroid tumor and the innocent microscopical appearance of the metastatic tumor it was thought to be a case of benign metastasizing goiter.

In 1911 Alamartine and Bonnet (1b) rendered a further report on the same case and told of the later development of multiple metastases in the right femur (with spontaneous fracture) and to the vertebrae followed by death.

Further proof of this tendency to report such cases prematurely is to be found in the first and second reports of a case by Oderfeld and Steinhaus (58). In 1901 under the

title "*Zur Casuistik der Knochenmetastasen von normalem Schilddruesengewebe*" they told of a woman of 58 with an egg sized elastic tumor replacing the left frontal bone. It had attained this size in 3 months. It was diagnosed as sarcoma and extirpated. The tumor was exceedingly vascular and extended to the dura mater. The convalescence was uneventful and when the patient was seen a half year later there was no recurrence and she was in excellent health. Microscopically the tumor was made up of normal appearing thyroid tissue. There were no enlargement of the thyroid gland and no palpable accessory thyroids.

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THE TRANSPLANTATION OF PARATHYROID IN PARTIAL THYROIDECTOMY

By FRANK H. LANEY, MD, FACS, BOSTON, MASSACHUSETTS

THE careful search for parathyroid bodies on the surgical specimens of thyroid lobes removed during our operative thyroid procedures has resulted in the not infrequent discovery of these bodies particularly in the region of the upper pole of the gland. We have found them on the posterior surface of the gland on the internal surface close to the point where the upper prolongation of the gland rests against the trachea and on the external surface where the pole is in contact with the internal jugular vein. Dr. R. B. Cattell, working on the material from our clinic, has demonstrated several parathyroid bodies within the substance of the gland in the upper pole and entirely surrounded by thyroid tissue.

It is of course obvious from the section shown in Figure 1 that it would be impossible to remove the lobe in such a case as this without removing the parathyroid also.

Up to within the last year we have been accustomed to look with complacency on the occasional appearance of a parathyroid body on a surgical specimen and to feel that since it was practically impossible not to remove an occasional upper parathyroid body and that since we have had but 2 cases of tetany in 3,100 thyroid operations, there was no occasion to be disturbed by their appearance now and then upon a surgical specimen. We felt that our plan of subtotal thyroidectomy was such as to insure the preservation of one or both of the inferior parathyroids and with the incidence of complete tetany as low as stated above have paid little attention to these specimens of parathyroid except to study their histological structure.

We have within the last 2 years come to believe that the occasional discovery of parathyroids on the specimen should not be made in the laboratory but at the operation by carefully examining the thyroid lobes as soon as they are removed and that if parathyroid bodies are discovered they should immediately

be transplanted with the possibility of their continuing to live, function, and supply their valuable secretion so necessary to the organism should there be a deficiency of that substance.

Dr. R. L. Mason of this clinic has shown conclusively that while gross tetany appears but rarely following subtotal thyroidectomy many of the signs of partial tetany may be elicited following this operative procedure such as the accoucheur's hand following the application of blood pressure cuff, Chvostek's sign and lowering of the blood calcium. The demonstration of these facts indicates to us the narrow margin of safety which probably exists postoperatively between a sufficient and an insufficient amount of secreting parathyroid tissue available for the organism.

Since parathyroids have been successfully transplanted in animals since the glands are entirely wasted otherwise and since every thyroid operator is or should be familiar with the appearance and location of the parathyroid bodies, we urge the immediate search for parathyroids at the operating table and their immediate transplantation when they are found.

We have in the last 6 months found and transplanted parathyroids in 10 cases. We have had no opportunity to demonstrate whether or not they have been successfully grafted but have kept careful records as to the cases and the location of the grafts in case the opportunity should arise later to demonstrate their persistence or non-persistence in their transplanted state.

The transplantation is always made into the belly of the left sternomastoid muscle so that there shall never be any question regarding the muscle into which the lobes were transplanted if an opportunity presents itself for examining them at a later time.

The technique of transplantation is extremely simple and requires little further elucidation than is evident in the illustrations.

filtrate the neighboring tissues in an irregular fashion. The frequency with which osseous metastases have produced spontaneous fractures indicates that these metastases must infiltrate and produce bone absorption in the same manner as those neoplasms concerning which there is no question as to their frank malignancy. In our series of collected cases pathological fracture occurred 12 times and of these 7 were femoral and 5 were humeral.

PREDILECTION FOR OSSEOUS METASTASIS

The striking predilection of secondary epithelial tumors of thyroid origin for growth in bones particularly in the cancellous vertebral bodies and in the diploe of the cranial bones is manifested in the reported cases of metastasizing goiter. The following table represents the relative frequency with which the various bones were involved.

Skull	30 times	Femur	9 times
Vertebrae	25 times	Ribs	7 times
Pelvis	11 times	Humerus	7 times
Clavicle	9 times	Scapula	3 times
Sternum	9 times	Mandible	times

In every case but 4 it was the bone tumor which produced the symptoms which caused the patient to seek medical aid. In this way they simulate carcinomata arising in the prostate and renal hypernephromata which frequently give signs of osseous metastasis before the primary new growth has been discovered.

Most of the thyroid bone metastases have been diagnosed clinically and roentgenographically as sarcomata. This emphasizes the need of considering secondary tumors particularly those originating in the thyroid, prostate, breast, adrenal and kidney in all cases of skeletal new growth.

Two interesting observations that may possess diagnostic significance are the presence in the metastases of visible and palpable pulsations synchronous with the heart beat and the tendency of the metastases to fluctuate in size during menstruation and pregnancy. *Brui* has been heard on auscultation over many of the pulsatile osseous metastasis. Pulsation is a particularly prominent

feature in those metastases which arise in the diploe of the squamous cranial bones and erode the inner table of the skull and come to lie on the dura mater. Several instances have been reported in which a pulsating thyroid metastasis in the sternum or clavicle has been mistaken for aortic aneurism. Recurrence following attempted extirpation of solitary osseous metastases is common even though the clinical evidence of recurrence may not appear for many years. Because of this tendency toward recurrence and spontaneous fracture with non union and in view of the relatively slow growth of thyroid carcinomata, amputation seems to be the most rational treatment in those cases in which the long bones are involved.

The reports of three cases from this laboratory tell us much regarding the manner of growth of thyroid tissue in bones. The first case illustrates quite convincingly the great variability in the histological appearance of the metastatic thyroid tissue. The second case was reported (1913) soon after the discovery of apparently normal fetal thyroid tissue at the site of a spontaneous fracture of the femur as another instance of metastases of normal thyroid tissue. The third case is likewise in striking analogy with the previously reported cases of benign thyroid tumors with metastasis.

REPORT OF CASE WITH VERTEBRAL METASTASIS

Mr H F age 66 was admitted to the neurological clinic on January 28, 1910 complaining of sharp shooting pains and weakness in the shoulders and arms. The pains began during April of the preceding year and at first involved only the left shoulder and arm. In December weakness of the left upper extremity was noticed for the first time. During the month before admission the right upper extremity was similarly affected. He experienced a feeling of weakness in the lower extremities during the same period.

On physical examination the left pupil was smaller than the right. The forearms and hands were somewhat atrophied especially the thenar eminences. Flexion and extension at the elbow and wrist and the hand grip were weakened. There was anesthesia to light touch on the ulnar side of both hands involving the entire fourth and fifth fingers and the ulnar half of the third finger. Triceps reflexes were absent on both sides. There was diminution in faradic irritability in the triceps and

PYLEPHLEBITIS AND LIVER ABSCESS FOLLOWING APPENDICITIS

BY E. L. FLIASON, A. B. M. D. F. A. C. S. S. C. D. PHILADELPHIA

PYLEPHLEBITIS and abscess of the liver have come to be regarded by many writers as synonymous. Liver abscess may arise through four channels: the portal veins, the hepatic artery, the bile ducts, and possibly, although in no case has this been demonstrated through the lymphatics. When the hepatic artery is the portal of entry, the abscesses are small and multiple; the patient dying from the original blood stream infection, when the bile ducts carry the infection, the abscesses are distributed accordingly, and pus is found in the ducts. The lymphatics as carriers are probably concerned in diffuse peritonitis cases. It is only when the infection travels via the portal veins that we can have both pylephlebitis and hepatic abscesses; even then the two conditions are not always associated, as is subsequently shown by one of the cases reported in this paper.

By far the most important single cause of this condition is suppurative appendicitis. Langdon Brown collected 46 cases and found that appendicitis was responsible in 42 per cent. It is, however, true that in some countries dysentery is the most frequent cause of liver abscesses but not of pylephlebitis. Infection in the portal system due to appendicitis may be limited to the vessels of the meso-appendix, the cæcal branches of the colica dextra, or it may be more extensive and result in a widespread thrombophlebitis of the suppurative type with a single or more often multiple hepatic abscesses. If the abscesses are single, infection usually involves the right side of the right lobe and probably is due directly to a septic embolus from one of the appendiceal vessels (Cases 2, 4, 7, 13).

Sérège (Bruggeman) seems to have proven by means of Chinese ink injectors that there are two currents of blood in each portal vein, one originating from the superior mesenteric vein going to the right lobe, the other coming from the inferior mesenteric veins being distributed chiefly to the left lobe. This may account for the greater frequency of right

lobe solitary abscesses, although cases are reported showing left lobe involvement. In the series reported in the present article, however, left lobe involvement was associated only with multiple abscesses. Liver abscesses following a pylephlebitis are usually multiple and are distributed in the immediate vicinity of the portal system. When there is a suppurative inflammation about the appendix, a local purulent thrombophlebitis may occur, followed by a loosening of the inferted clot with the formation of multiple infective emboli in the smaller hepatic branches of the portal vein. Each embolus of this nature may and usually does become the center of a small abscess, and such abscesses may be so abundant as to be strung along the course of a group of vessel branches much like a bunch of grapes (Fig. 1). Surrounding the abscesses there is intense congestion as a result of the toramnia and circulatory disturbances; a parenchymatous change occurs in the entire liver varying anywhere from ordinary cloudy swelling, central necrosis, and fatty degeneration to a picture very closely simulating acute yellow atrophy (Case 5).

Koerte is quoted as believing that the suppurative process usually travels upward through the retrocæcal tissues. This was not the case in any of the cases reported in this article. It is true that often (10 of the 14 cases) there is evidence of a parietal and retro-peritoneal cellulitis shown by oedema, but in none of the reported cases was any pus collection found in these areas. Subdiaphragmatic abscesses occur after suppurative appendicitis but they are probably secondary to a liver abscess that has broken through into this area. This was found to be the case in 2 of the cases here reported (Cases 4 and 13). Occasionally a chronic appendicitis may be responsible for a liver abscess as is illustrated in all probability although not proven by Case 1 of this paper. In this connection Heyd states that bacteria carried to the liver do not always undergo proliferation but are

thyroid tissue (99) Through extensive correspondence with the patient's relatives and family physician and examination of the death certificate it has been learned that this patient subsequently developed a rapidly growing hard irregular goiter with infiltration to the neighboring neck vessels and progressive signs of dyspnea, dysphagia and aphonia. Death occurred within 18 months of the operation from unquestionable carcinoma of the thyroid gland. Unfortunately no autopsy could be obtained.

REPORT OF CASE WITH METASTASIS TO ASTRAGALUS

This case has many points of similarity to the preceding one. A middle aged man complained of severe pain in his right foot and a feeling that the bones of his foot were giving away. The roentgenological examination showed a distinct diminution in density in the astragalus and the diagnosis of sarcoma was suggested. At operation the bone was so firm reddish with much the appearance of firm currant jelly and cut with the resistance of cheese. Microscopic study of the tissue revealed the presence of typical thyroid tissue. Healing occurred *per primam* and the patient left the hospital. At this time the thyroid gland presented a small symmetrical soft enlargement with nothing to suggest malignancy. This case was likewise believed to be one of simple goiter with metastasis. Had this case been reported immediately following the operation it might well have been considered another instance of benign metastasizing goiter. Two years later this patient died an asphyxiative death with undoubted clinical evidence of carcinoma of the thyroid gland. The patient had left the hospital and no autopsy was done.

These last two cases might well have been considered instances of metastasis of normal thyroid tissue early in their clinical course. The ultimate exodus with frank carcinoma of the thyroid gland indicates that the microscopic appearance of the secondary growths is not a dependable criterion. No single case in the literature offers complete and convincing evidence of the innocent character of the tissue from the thyroid gland or of its metastases.

A study of the literature concerned with thyroid carcinomata indicates at once that great uncertainty has existed as to what constitutes malignancy in primary thyroid new growths. There can be no doubt but that the metastases of thyroid carcinomata are subject to the greatest variability in microscopic appearance. This is as true in cases of undoubted carcinoma as it is in those which

have been called "benign metastasizing goiter." It is this variability that has most frequently led to the contradictory diagnosis of innocent goiter with metastasis. To consider the possibility of such a circumstance as a benign neoplasm giving rise to multiple metastases is to question the validity of the few fundamental facts which we possess regarding malignant new growths.

It would seem therefore with this abundance of evidence in contradiction to the benign metastasizing goiter theory that there is no such entity and that they represent in fact instances of unrecognized carcinoma of the thyroid gland with metastasis.

CASE 1. Alamartine and Jaboulay (1a) report the case of a woman aged 3. There was pain and limitation of motion of the right arm with a pulsating tumor in the upper right humerus which had reached the size of an orange. The patient had lost weight and a bruit could be heard. A diagnosis was made of aneurysmatic sarcoma of the humerus. The upper humerus was resected. Microscopic examination showed typical thyroid tissue.

A goiter had begun 2½ years previously and had reached tangerine size. It fluctuated with menstruation. There had been no modification in size during the development of the humeral tumor. No Basedow disease, no myxoedema. Over a year after the operation Alamartine and Bonnet (1b) reported. There had developed right sided sciatica with disturbances of sensibility and muscular atrophy pain on pressure over the upper extremity of the femur weakness of the lower extremities spontaneous fracture of the neck of the right femur while in bed complete paraplegia urinary retention (vertebral metastasis) painful left thigh and cystitis. Progressive cachexia was followed by death. No microscopic examination of the metastases to the right femur or vertebra was made.

The thyroid gland underwent no change during the 19 months which had elapsed between the resection of the upper humerus and death and no microscopic examination of it was made. No autopsy was performed.

CASE 2. Reilly (2) Male aged 65. A tumor had obstructed the right nostril for 6 months. A diagnosis was made of sarcoma of the antrum of Highmore and incomplete extirpation done. Microscopically the growth was typical thyroid tissue and areas showed solid cellular appearance. The growth increased rapidly following operation. Death occurred 8 months after onset.

There was no hypertrophy of thyroid before or after operation. No histological examination nor autopsy was made.

CASE 3. Bell (3) A man aged 48 had had pain in the right hip-joint for several months. The right femur fractured spontaneously while patient was in bed. A tumor then developed in the left iliac region. Death occurred 2½ years after the onset of illness. Autopsy. Femoral metastasis showed microscopically a structure resembling undeveloped fetal thyroid. The acinar arrangement was easily recognizable. The tumor was lined by cuboidal cells and contained thin colloid. Certain areas showed the same structure as thyroid adenomata. The iliac metastasis presented vesicles like those of normal thyroid but much more evident.

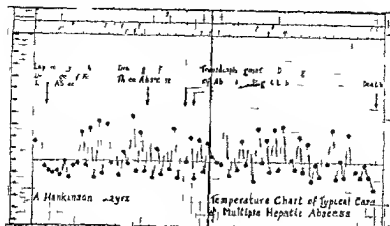


FIG. 2. Case 1. Chart showing typical temperature curve of patient with multiple hepatic abscesses.

that hepatic abscess was a co existing condition. As has been stated above this is not always true. In the last 237 cases of acute appendicitis operated upon at the University of Pennsylvania Hospital there have occurred only 3 cases of hepatic abscess an incidence of 0.13 per cent a percentage closely approximating the figures quoted earlier in this paper. The writer has collected from the University of Pennsylvania Howard and Philadelphia General Hospitals 14 cases in all 12 of liver abscesses and 2 of pylephlebitis 10 of which were personal cases. The condition had been present from weeks to months when 7 of these 10 cases were admitted to the hospital. In only 3 of the cases had the original operation for the appendicitis been performed by the writer. All of the personal cases were seen after June 1922.

SIGNS AND SYMPTOMS

Munro states that the most important clue in making a diagnosis is the recognition of the causative appendicitis. This may be true in the diagnosis of more or less obscure cases of suspicious liver infections but is of no significance when one has a patient convalescing from acute appendicitis who is not doing just right.

Temperature. According to Gerster 'chills accompanied by a rapid rise of temperature observed during the course of an appendicitis however mild as to the local symptoms may

and usually do signify entrance of the 'septic material into the portal and general circulation'. This must be looked upon as a sign of the greatest import whether it occurs before or after the operation. Occurring before operation it should guard us against too favorable a prognosis. A chill occurring immediately after operation indicates that there has been a rapid spread of the infection into the portal system and in such cases the result is usually profuse pylephlebitis and multiple abscesses of the liver (Case 12). However, should the case show the usual postoperative temperature curves with a gradual drop to 99 or 100 degrees in 3 or 4 days and then a rise to 101 to 102 degrees 5 to 8 days later associated with a chilly sensation one should suspect a very circumscribed venous infection or thrombosis that has resulted in the floating of a septic embolus into the liver. In this type of case there is frequently only a single abscess and when this is evacuated recovery results. If the condition becomes one of continuous fever with repeated chills and a temperature of 104 and 105 degrees a diffuse pylephlebitis and multiple liver abscesses should be suspected. Profuse sweating quickly follows the daily chills. Should the chill and fever persist after the evacuation of a solitary abscess one must suspect other abscesses.

Leucocytosis. In all of the writer's 10 cases there was a very high leucocyte count with a

CASE 11. Devic and Berel (11). A woman aged 54 entered the hospital with signs of myocardial failure and died 2 hours later. *Autopsy*. There were edema of the lower extremities and cardiac hypertrophy. In the right ventricle was an elliptical tumor measuring 19 by 13 millimeters near the pulmonary valve which was lighter in color and softer and more elastic in consistency than the surrounding tissue. It resembled a uterine myoma. Histologically it was thyroid tissue with large and small follicles filled with colloid. The surface was covered by intact endothelium. It was separated from the myocardium by fibrous tissue of varying thickness but continuous. There were areas of firm connective tissue containing nests of epithelial cells arranged in minute vesicles without colloid. At one point between the muscle bundles in the immediate neighborhood was a small circumscribed nest of thyroid follicles.

The thyroid gland was normal in size and presented no abnormalities. *No histological description* was given.

CASE 12. Ehrle (12). A woman aged 53 had a tumor of hazel nut size on the right parietal bone. Signs of cerebral compression appeared 3 years later. The tumor grew to be the size of a child's head, was fluctuating and elastic. No further tumors were detected clinically and no operation was performed. *Death Autopsy*. The parietal tumor infiltrated the dura mater. There were several pea-sized nodules in the lung—soft yellowish marrow like. Microscopically the picture of a simple colloid goiter predominated though single cell heaps without glandular form were present. Lung metastases showed similar structure.

The patient had a small goiter which had been stationary for many years and had remained unchanged during the 3 year interim. Histologically it was a simple colloid goiter. However there were present numerous solid strands and heaps having carcinomatous characteristics.

CASE 13. von Eiselberg (13). A man aged 71.6 years previously had received a blow on the sternum followed by a hard tumor which reached egg size. Extirpation was followed by death. Microscopically it consisted of vascular tissue with some cystic colloid formation.

The thyroid gland was slightly enlarged. In the left lobe were some hard nodules. The left lobe showed the structure of colloid goiter.

CASE 14. von Eiselsberg (14). A man aged 38 had a fist sized tumor in the midline between the parietal bones with many dilated vessels. The tumor enlarged when he bent over. It was diagnosed as sarcoma and extirpated. It was found to be adherent to the dura. Microscopically it was a typical adenoma of the thyroid with some colloid development. There was a recurrence 4 years later. The patient was alive 8 years after operation.

The patient had had a goiter since the age of 20 years. There was no enlargement during the postoperative period of observation. *No microscopic examination*. *No autopsies*.

CASE 15. Franchet (15) reports the case of a man aged 63 with metastases to the sternum spine and pelvis. Microscopically the tissue was normal thyroid.

CASE 16. Fwald (16). A woman aged 45 had pain in the angle of the right scapula. A tumor appeared reaching fist size in a year. The diagnosis as metastatic goiter. The tumor of the scapula when extirpated measured 11 by 6 centimeters. It was yellow brown cystic nodular. Microscopically there were many follicles covered by simple columnar epithelium and filled with colloid. There were atypical proliferating cells masses as in adenocarcinoma of the thyroid gland.

A goiter of 4 years duration reached orange size and was removed 1 year previously. A nodule then appeared

in the right lobe and was extirpated. Some infiltration aroused suspicion of malignancy. The structure was that of simple colloid goiter. *No autopsy*.

CASE 17. Iabris (17). Woman aged 57. Symptoms of compression of the spinal cord first appeared 1 year before death. There was a soft reddish elastic tumor of the body of the third dorsal vertebra of hen's egg size with compression myelitis. Death was from bronchopneumonia. Histologically the tumor was thyroid tissue partly colloid partly parenchymatous with vascular connective tissue. There was complete absorption of bone. The follicles did not possess the biological characteristics of malignancy.

There was an old unilateral goiter without adherence to the neighboring tissues. Histologically it presented all the characters of benign thyroid adenoma. It was impossible to find any indication of malignant degeneration.

CASE 18. Feuter (18). A woman aged 58 within 1 year following trauma developed a large fist sized pulsating tumor over the left parietal bone which penetrated the skull. It was diagnosed sarcoma and partially extirpated. Bleeding was profuse. Recurrence was followed by death 10 months after operation. Microscopically the tissue was identical with that of colloid goiter.

The patient had a small fist sized goiter. Microscopically it was a simple colloid goiter. *No autopsy*.

CASE 19. Lataun and Koehlichen (19). A girl 17 years of age 1 month previously had had vertigo vomiting Romberg's sign visual impairment and headache. The reflexes were normal. A diagnosis was made of cerebellar tumor. In the right occipito-temporal region was a small soft tumor mass distinctly pulsatile with bruit. Death occurred in 45 months. *Autopsy*. The tumor had eroded the bone below the external occipital protuberance. There was compression of the cerebral convolution and invasion of the right cerebellar hemisphere. Microscopically the tumor showed alveolar structure rich in colloid abundant connective tissue and numerous mitotic figures.

The thyroid gland was enlarged especially the right lobe which contained a firm encapsulated nodule. Histologically it presented the aspect of normal thyroid tissue almost filled with colloid and covered with a layer of flattened cells.

CASE 20. Foerster (20). A woman aged 49 showed signs of compression myelitis due to a pulsating vertebral tumor simulating aneurism. Cystitis a large decubitus and septic fever developed followed by death. *Autopsy*. Metastasis replaced the sixth thoracic vertebra compressing the spinal cord. There was a metastasis in the sixth left rib the size of a child's fist. There were metastases to the third fourth and fifth thoracic vertebrae and multiple pulmonary metastases. Microscopically there were many areas resembling normal thyroid tissue. Other areas resembled adenocarcinoma with ability to form rich colloid.

The patient had a medium sized goiter. The nodules in the right thyroid lobe became smaller prior to death and became intensely hard. There was no infiltration. *No microscopic examination* was made.

CASE 21. Gierke (21). A man aged 57 experienced 4 years previously radiating pains in the hip joint with haematoma. A diagnosis of renal calculus was made. For 2 years there had been a stinging sensation in the right fifth intercostal space then pains in the sixth and seventh interspaces. Finally there was a girdle sensation around the chest and spastic paraplegia of both lower extremities with cramping pains in the lower trunk. The abdominal muscles became paralyzed and there was anaesthesia of the lower half of the body. Ankle clonus developed but there was no vertebral deformity. A large sacral decubitus with septicemia led to death. A clinical diagnosis was made of myelitis transversalis dorsalis of unknown etiology.



Fig 5 Case 4 Six weeks after drainage of subdiaphragmatic and liver abscess. Right diaphragm high flat and fixed. Considerable fibrosis at right base.



Fig 6 Case 6 Roentgenogram showing condition two and one-half months after an attack of appendicitis. High right diaphragm with fixation.

of the lower ribs in the midaxillary line with the characteristics of a lymph rather than a vascular edema. Compared with vascular edema it pitted with more difficulty and the depression lasted longer. Again when the tissues in both flanks were picked up between the fingers and thumbs of each hand those of its affected (usually the right) side were found thicker than normal. *This sign I have come to consider of enough significance to warrant exploration when the symptoms previously mentioned are present.* In late cases this peculiar doughy condition affects the anterior abdominal wall and is frequently accompanied by an increased prominence of the veins over the lower chest and upper abdomen. This dilated condition was noted in 9 cases.

Nausea and vomiting. In 5 of the series vomiting occurred but it was not a very prominent feature and in most cases occurred only occasionally and then only after taking food. Nausea however, was bitterly complained of by some. Neither nausea nor vomiting was dependent upon the number or posi-

tion of the abscess nor could they be used as an index for prognosis.

Ascites. In only 1 case and that of a severe pylephlebitis with multiple liver abscesses was a note found of any undue fluid in the abdomen.

Lassitude, anorexia, emaciation. Without exception the entire series showed these three conditions in a marked degree. Almost invariably the patients would state that they felt all right but were too tired to sleep. Food was distinctly distasteful and could be administered only under protest. Rapid loss of weight was a marked feature also, varying in its degree with the amount of liver disease.

X-ray findings. Roentgenograms and fluoroscopic examinations were made in 10 cases. Negative reports were returned in only 2. The other 8 cases were all reported by Dr. Pancoast as showing elevation of the right side of the diaphragm and in some instances restriction of movement on that same side. In 3 of the series there was also a shadow in the lower right chest interpreted as fluid. This

like mass. Microscopically all the tumors showed goiter tissue without signs of malignant degeneration.

The right thyroid lobe became enlarged to apple size. At autopsy the thyroid was found completely encapsulated with right sided goiter. Microscopically the tissue was simple goiter without evidence of malignancy.

CASE 37. Heschl-Wolfer (31). A man aged 35 had metastatic nodules in the lung, the structure being that of thyroid vesicles.

There was a tumor of the thyroid the size of an infant's head. Extirpation was followed by recurrence 2 years later. At the second intervention death followed 3 days after operation. *Autopsy.* Microscopically the tissue from the first operation was thyroid adenoma (Heschl) from the recurrence intermediate forms between adenoma and alveolar cancer, some areas being typically alveolar.

CASE 32. Hinterstoss (35). A man 38 years of age had symptoms of chronic meningitis. At autopsy a large tumor was found involving the base of the skull and the entire sphenoid bone. Microscopically this was an adenocarcinoma of thyroid origin with many large follicles and marked colloid development like that seen in normal thyroid tissue. There were multiple pulmonary metastases.

Only the left side of the thyroid gland was enlarged. It contained adenomatous masses.

CASE 33. Hinterstoss (33) reports another case in which there were multiple metastases to the vertebrae, rib and lungs all colloid in type. There were also metastases to the skull, adenocarcinomatous in type. In the enlarged lobes of the thyroid were many colloid nodules.

CASE 34. von Holmann E. from Delennoy and Dhal Jun (34). A woman 43 years of age had a rapidly growing tumor of the scapula which appeared 9 months after ablation of the thyroid nodule. It was extirpated but recurred in 2 years. There was a second intervention. Death occurred 2 years later without recurrence. Microscopically the first tumor was adenocarcinoma.

The patient had had goiter for 4 years. The nodule from the right lobe was extirpated 9 months before the scapular tumor appeared. Microscopically the image was that of colloid goiter without malignant characteristics. *No autopsy.* An incomplete microscopic examination was made.

CASE 35. Hölzl (35). A man aged 45 complained of severe headache, dizziness and vomiting of 9 months duration and finally paralysis of the lower extremities and anesthesia below the costal margin and the tenth dorsal vertebra and incontinence. The Babinski reflex was present. A large deep-seated rapidly growing tumor appeared behind the left clavicle and sternomastoid which 6 months had in size. (Malignancy of accessory thyroid?) At autopsy a walnut sized tumor was found beneath the cerebral membranes to the left of the falx cerebri with compression of the brain. Similar tumors were found on the left side of the cerebellum and in the body of the third dorsal vertebra with pressure on the cord. There were metastases in the liver and adrenals. Microscopically the thyroid tumors showed areas of malignant growth especially those in the adrenals.

There was no enlargement of the thyroid. *No gross or microscopic examination* was made. The mass behind the left clavicle and the sternomastoid may well have been a carcinomatous accessory thyroid.

CASE 36. Honsell (36). Woman aged 20. In the frontal bone was a very slow growth the size of a pigeon's egg extending to the dura. The microscopic appearance was that of colloid goiter without signs of malignancy. A cystic tumor had been removed from the same region 7 years previously.

A partial thyroidectomy of a fist sized left lobe was performed 2 years before the second appearance of the frontal tumor. There was considerable growth of the goiter in the interim. Microscopically the structure was that of colloid goiter with solid round or fibroform islands of epithelium characteristic of rapidly proliferating cells. Occasional solid epithelial strands at periphery of tumor. *No autopsy.*

CASE 37. Huguenin (37). A man 58 years of age had severe pains in the back which began 1 year previously. Later there developed pains in the legs, stiffness, weakness and inability to move the legs actively. In an angular curvature in the middle of the back a soft fluctuating painless tumor was felt. Its presence was unknown to the patient. The patellar reflexes were exaggerated. Sensation was diminished below the umbilicus with urinary and fecal retention. There was a bilateral Babinski reflex with sacral decubitus and suppurative. Death. *Autopsy.* The tumor involved the sixth, seventh and eighth dorsal vertebrae and simulated an acute swelling of the spine. The mass encroached on the spinal cord. Microscopically the sixth vertebra showed solid cell strands with polygonal round and spindle forms. The seventh showed the picture of thyroid gland of adult with many follicles filled with colloid and surrounded by a single layer of cubical and cylindrical epithelial cells.

At autopsy both lobes of the thyroid gland were somewhat enlarged. The left (6 centimeters) more than the right (5 centimeters). The lower pole of the right lobe was intrathoracic. The capsule was intact. Microscopically throughout the picture was that of parenchymatous colloid goiter. After repeated searches a small whitish nodule (4 by 3 millimeters) was found in the lower pole of the left lobe. This area was definitely carcinomatous showing anastomosing cords of round and oval hyperchromatic cells.

CASE 38. Hutchinson (38). A woman 50 years of age had rheumatic pains in the left shoulder for 5 months following a fall. The swelling appeared in the upper third of the arm. At exploratory incision a small growth was found near the deltoid insertion. During operation the humerus fractured spontaneously. Amputation was followed by healing with death in 6 months. Cachexia was marked. Microscopically the picture suggested metastases of thyroid tissue as in Morris's case.

The thyroid gland was not examined and there was no autopsy.

CASE 39. Jaboulay (39). A man 60 years of age had a tumor of the clavicle near the sternoclavicular articulation which had developed at the same time the goiter appeared. It was as large as the two neck tumors combined and was firmly adherent to the bone with crepitation on movement. At extirpation several small encapsulated thyroid masses were found behind the clavicle. *No histological examination* was made.

The patient had had a slight goiter for 2 years with more rapid growth during the past 14 months. It consisted of 2 masses in juxtaposition, each the size of a tangerine. There were no signs of compression or Basedowism and no infiltration of the neck structures. It was clinically benign. Operation followed extirpation of the clavicular tumor when esoplastic infiltration of the trachea was found. *No histological examination.* *No autopsy.*

CASE 40. Jacobaeus (40). A man 40 years of age 1 year previously experienced 5 of sensation in the abdomen and hip, twitching of right leg and girdle pains around the abdomen. Babinski's sign was present with kyphosis of the second and third thoracic vertebrae. The X-rays showed destruction of the third thoracic vertebra. The clinical diagnosis following extirpation of the thyroid



Fig 8 Case 7. Roentgenogram of chest 18 days after appendectomy. Shadow at right base with high restricted right diaphragm. Slight pleural collection right lateral chest wall.



Fig 9 Case 7. Roentgenogram showing liver abscess cavity outlined with bismuth subcarbonate. This picture was made one week after the abscess had been drained.

textbooks state that pylephlebitis is practically invariably fatal.

If a careful survey of the reported series be made two very startling facts are brought to light. The first of these is that in every case a provisional diagnosis and often a retained diagnosis of a right basal pneumonia was made. This was based on the physical findings of a compressed lower lobe together with effusion in some instances. The X ray disproved the pneumonia diagnosis in each case. Therefore in looking over the cases as collected and noting the increasing frequency of diagnosis 14 cases in 3 years in the writer's service as compared to a previous total of 53 in the literature one cannot help but believe that in many of these cases a diagnosis of septic pneumonia was made. The X ray has made this error in diagnosis impossible and has shown the condition as it really exists.

The second startling fact brought out is that a positive operative diagnosis was made very tardily in all cases. In the 3 cases that developed after appendectomy by the writer the diagnosis was made of pylephlebitis and liver abscess in 14, 19 and 20 days. In the cases coming to the hospital with the condition already present the histories proved the dis-

ease to have been present for periods varying from 2 weeks to 11 months. 3 cases being respectively of 8, 10 and 11 months duration a sad commentary on our diagnostic ability.

TREATMENT

Operation was performed in all cases. The 7 solitary abscesses were approached through the chest. Under local anesthesia the abscess was found with the needle. The rib usually the tenth in the midaxillary line was resected the needle still in place. The diaphragm was sutured in some instances and in others packing was placed against the pleura. The needle was withdrawn and the patient sent back to bed to be returned the following day. An exploring needle was again inserted and when pus was located the actual cautery was slid along the needle until an opening was burned into the abscess cavity. This was then drained with a tube.

In the remaining 7 cases laparotomy was performed. In Case 1 7 or 8 operations were performed and as many abscesses drained including an enormous subdiaphragmatic collection.

CASE 1. A. H., a male 22 years of age gave a history of an attack of appendicitis 10 months before

with no adherence to the skin. It was thought to be sarcomatous and was extirpated. Microscopically it was intermediate in form between fetal adenoma and colloid adenoma with more numerous mitotic figures than those ordinarily seen in thyroid adenomata. Following operation there were lancinating pains in the left thigh, then paraplegia of the lower extremities, urinary and fecal incontinence, anasthesia below the umbilicus (vertebral metastases) with death 2 months after operation.

There was a small tumor of the thyroid gland under the left sternomastoid rising with the larynx upon deglutition which was firm uniform in consistency smooth and not adherent. It had appeared a few months previously with no increase in volume. There was no clinical evidence of malignancy. No microscopic examination. No autopsy.

CASE 51. Latten (51) reports the case of an adenoma gelatinosum in the femur lumbar vertebrae and pelvis with malignant appearing metastases to the lungs and bronchial lymph nodes. The patient had a gelatinous growth.

CASE 52. Meyer (52) A woman 48 years of age had a smooth painless tumor of the right temporal and parietal region which grew to 10 centimeters in diameter in 15 months. Recently the growth had been more rapid. The right thigh had fractured spontaneously with non union. The tumor of the cranium grew slowly and produced right exophthalmos. A bruit could be heard over it. Death occurred 2 years and 8 months after onset. Autopsy. There were metastases also to the bronchial and inguinal nodes and the lung. Microscopically the skull tumor showed for the most part typical thyroid vesicles with colloid content resembling normal thyroid. The bronchial nodules resembled atypical cells of the middle thyroid lobe. The inguinal nodes showed normal appearing thyroid tissue and small vesicles without colloid. The femoral tumor was made up of small colloid free vesicles. Test for iodine was negative.

The thyroid gland was enlarged mostly on the left (8 centimeters in diameter). At autopsy the left lobe was moderately enlarged but extended into an orange sized tumor just above the left clavicle. The right lobe was of walnut size. The middle lobe was enlarged and whitish. Microscopically the middle and left lobes showed small vesicles surrounded by atypically arranged cell heaps. Some parts contained normal colloid. It suggested transformation of adenoma into carcinoma.

CASE 53. Middeldorp (53) A woman 56 years of age had a fluctuating large tumor of the left thigh of 1 1/2 years duration with radiating pains in the foot and leg. Later a painful tumor of the occiput appeared and was partially extirpated. Microscopically the structure was that of thyroid adenoma. Eight months after operation spontaneous fracture of both thighs occurred and later fracture of both arms. The patient died 3 years after the onset with marked marasmus. At autopsy multiple small nodules were found in the lungs, a fat sized occipital tumor penetrated the dura mater. There were other nodules in the lumbar vertebrae sacrum pelvis femora and humeri. Microscopically all showed the structure of benign thyroid adenoma.

In the left lobe of the thyroid gland was a small nodule the size of a pigeon's egg freely movable whose duration was unknown. It had not become augmented at any time. Histopathologically it was a benign thyroid adenoma. In the cells of one had penetrated the capsule.

CASE 54. Mignon and Bellot (54) A man 68 years of age had a pulsating tumor of the dorsolumbar spine which appeared after an injury and grew steadily for 3 years to the size of a large egg. There were lancinating pains in

the thighs and buttocks. At operation the spinous process and lamina of the twelfth dorsal vertebra were found entirely replaced by soft vascular tissue. Clinical improvement was followed by recurrence in 14 months with lancinating pains and trophic ulcers. A soft red friable mass 4 fingers breadth by 5 centimeters infiltrated the muscle. Death occurred 3 days after operation. Microscopically the mass resembled normal thyroid in part. Other areas were distinctly atypical.

The thyroid gland was moderately enlarged but had been disregarded during physical examination. There had been no change in volume for 13 months. Post mortem a small nodule of hazel nut size was found in the left lobe which gave a typical microscopic appearance of thyroid carcinoma. There was a partial autopsy only.

CASE 55. Morris (55) A woman 40 years of age had a large pulsating tumor of the left parietal region 6 1/2 by 7 inches. It had appeared 2 years previously following mild traumatism. She died 6 years after the onset. Partial autopsy showed a skull defect 1 1/2 inches in diameter. The tumor rested on the dura. Microscopical examination of the parietal tumor showed a structure similar to thyroid gland colloid containing cysts surrounded by flattened cells.

There was some diffuse swelling of the thyroid. No microscopic examination. Partial autopsy only.

CASE 56. Muzio (56) A woman 48 years of age had a tumor in the right gluteal region which developed rapidly following trauma. In 2 years it had reached the size of an orange and was extirpated. Microscopically it was colloid goiter.

The thyroid gland had been moderately enlarged for 10 years. No microscopic examination and no autopsy was performed.

CASE 57. Neumann (57) A woman 54 years of age had an apple sized elastic tumor of the right arm just above the humeral condyles. The overlying skin was red and infiltrated. There were no pulsations and the forearm was atrophied. There was abnormal mobility and crepitation of the humerus just above the elbow. A diagnosis was made of sarcoma with spontaneous fracture. Amputation was done and the patient died 14 days after operation of gangrene of the wound. Microscopically the tissue simulated the appearance of normal thyroid parenchyma. Spherical acini rich in colloid covered with simple cubical epithelium.

Post mortem a solid nodule the size of a goose egg was removed from the left lobe of the thyroid gland. It had a hard fibrous capsule with calcification and cysts. Microscopically there were large follicles surrounded by flat epithelium and filled with colloid. Normal thyroid tissue for the most part and compact nests of rapidly growing cells in the connective tissue with tendency to form a single layer. No complete autopsy.

CASE 58. Odenfeld and Steinhaus (58) A woman 58 years of age had an egg sized elastic tumor of the left frontal bone replacing bone which had appeared 3 months previously. The growth was slow at first then rapid. The patient had had headache only during the last 2 weeks. The diagnosis was sarcoma. At operation a yellow brown vascular tumor was found extending to the dura. Convalescence was wretched. Six months later (November 1900) there was no recurrence and the patient was in good condition. Microscopical examination showed alveolar structure with simple low columnar epithelium enclosing homogeneous colloid mass. The tumor was identical with normal thyroid tissue.

The thyroid gland was not enlarged and there were no accessory thyroids. No microscopic examination was made.

after the operation but he rallied somewhat after a blood transfusion and the following day his record showed a temperature of 99.2 degrees with a pulse of 110. Two days after the operation a left sided parotitis developed and a day later the other side became involved. The abdominal signs gradually improved but he died 6 days after the operation of profound toxæmia. Autopsy was refused.

CASE 3 J F a male 7 years of age was admitted to the Pediatric Service of the University Hospital after 8 weeks of illness at home. His sickness which began with abdominal pain vomiting and fever continued changing to a hectic type of fever with anorexia abdominal pain and distention. On admission the important findings were emaciation prominent subcutaneous veins in a distended abdomen and two doughy masses one in each lower abdominal quadrant. The white blood cells numbered 15,000 temperature was 99.6-99.7 degrees pulse 116 respiration 28. A tentative diagnosis of tuberculous enteritis was made and the patient was treated for some time with this diagnosis in mind. Nine weeks after admission he began to have recurrent attacks of higher fever and slight jaundice appeared with some vomiting and a leucocytosis of 20,000. The patient was then seen by the writer and a diagnosis was made of pylophlebitis following a perforative appendicitis and peritonitis which had been his first illness. Twelve weeks after admission a laparotomy was done through a right rectus incision. All abdominal organs were matted together with dense adhesions which were separated with difficulty. Back of the cæcum was a cavity lined with granulating tissue evidently an old abscess cavity. The appendiceal stump was hidden by dense new connective tissue. Drainage was instituted through a stab wound at *McBurney's point* after several adhesions had been released. The postoperative course was without incident. The temperature reached the normal line on the fourth day after operation and it showed little variation until his discharge 13 days later. He is now in perfect health and without symptoms.

CASE 4 J L a male 34 years of age was operated on for acute appendicitis 7 years before his admission to the University Hospital. Since that time he had had several attacks of sudden severe abdominal pain lasting for several days. On one occasion a large amount of pus was drained out through the site of the previous incision. The last attack began 7 days before and continued until his admission. He had a high remittent fever with several attacks of right sided pain but no nausea or vomiting. A lower right lobar pneumonia developed for which he was treated in the medical wards for 6 weeks. During this time there developed signs of fluid in each base especially the right (Fig 3). Attempts to drain this fluid were only moderately successful and the symptoms remained. The temperature ranged from 97 degrees F in the morning to 102.1 in the evening with frequent chills and sweats. He had some pain in the lower right chest

on deep respiration and the skin in this area was thick and tough and contained some dilated veins. He was markedly emaciated. White blood cell were 11,800 and the urine showed urobilin. A thoracentesis revealed pus. Under local anesthesia a piece of the ninth rib was resected and a needle inserted into the pleural cavity. Clear fluid was obtained. When the needle was directed through the diaphragm however thick foul pus followed the plunger. The needle track was enlarged and an abscess cavity found in the right dome of the liver. This was drained and packed. The patient did not seem to recover as rapidly as we had expected and a week after operation the roentgenogram was as shown in Figure 4. One day later a needle inserted in the eighth interspace located a pocket of thick greenish pus which proved to be a subdiaphragmatic collection easily reached by the finger through the first wound. He rapidly recovered and was discharged with a dry wound. Figure 5 shows the condition on the day before his discharge 6 weeks after the abscess was drained.

CASE 5 A R a male 42 years of age was admitted to the Howard Hospital after 12 days of right abdominal pain vomiting fever jaundice and diarrhea. On examination a mass was found in the lower right abdomen which proved to be an appendiceal abscess. The remnants of a gangrenous appendix were removed and drainage instituted. The third day after the operation he had a slight chill with subsequent rise in temperature. Two days later active hemorrhage began from the depths of the wound which was controlled by packing. The patient continued to have chills with a high remittent fever the temperature range being 105-108 degrees F. The blood culture was negative. White blood cells were 28,600. The urine showed bile pigments. On examination the liver was found somewhat enlarged and tender the skin was thick over it and the subcutaneous veins were dilated. There was some demonstrable fluid in the abdomen. The right diaphragm was found high and somewhat restricted in movement. The appetite was poor with frequent nausea and occasional vomiting. He continued to grow weaker gradually in spite of blood transfusions. A roentgenogram taken 5 weeks after the operation showed a high right diaphragm although there was no restriction in its movement noted under the fluoroscope. A pylophlebitis with secondary liver abscess was diagnosed 3 weeks after the appendectomy but operation was delayed until the patient could be built up a little preparatory to a second operation. Finally 6 weeks after the former operation a right transverse incision was made under local anesthesia about 5 centimeters above the umbilicus exposing a lemon sized abscess of the lower part of the right lobe of the liver. The liver was enlarged and tender. The abscess was evacuated and drained. Culture of the pus showed *staphylococcus aureus*. After operation the patient continued to run a septic temperature gradually growing weaker until his death 11 days later. A

with no adherence to the skin. It was thought to be sarcomatous and was extirpated. Microscopically it was intermediate in form between fetal adenoma and colloid adenoma with more numerous mitotic figures than those ordinarily seen in thyroid adenomata. Following operation there were lancing pains in the left thigh, then paraplegia of the lower extremities, urinary and fecal incontinence, anesthesia below the umbilicus (vertebral metastases), with death 4 months after operation.

There was a small tumor of the thyroid gland under the left sternomastoid ring with the larynx upon deglutition, which was firm, uniform in consistency, smooth and not adherent. It had appeared a few months previously with no increase in volume. There was no clinical evidence of malignancy. No microscopic examination. No autopsy.

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In the left lobe of the thyroid gland was a small nodule the size of a pigeon's egg, freely movable, whose duration was unknown. It had not become augmented at any time. Histopathologically it was a benign thyroid adenoma but the cell eosinophilic and peritestic capsule.

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the thighs and buttocks. At operation the spinous process and lamina of the twelfth dorsal vertebra were found entirely replaced by soft vascular tissue. Clinical improvement was followed by recurrence in 14 months with lancing pains and trophic ulcers. A soft red friable mass 4 fingers breadth by 5 centimeters infiltrated the muscle. Death occurred 3 days after operation. Microscopically the mass resembled normal thyroid in part. Other areas were distinctly atypical.

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Postmortem a solid nodule the size of a goose egg was removed from the left lobe of the thyroid gland. It had a hard fibrous capsule with calcification and cysts. Microscopically there were large follicles surrounded by flat epithelium and filled with colloid, normal thyroid tissue for the most part and compact nests of rapidly growing cells in the connective tissue with tendency to form a single layer. No complete autopsy.

CASE 58. Oerfeldt and Stenhaus (58). A woman 58 years of age had an egg sized elastic tumor of the left frontal bone replacing bone which had appeared 3 months previously. The growth was slow at first then rapid. The patient had had headache only during the last 2 weeks. The diagnosis was sarcoma. At operation a yellow brown vascular tumor was found extending to the dura. Convalescence was uneventful. Six months later (November 1900) there was no recurrence and the patient was in good condition. Microscopical examination showed alveolar structure with simple low columnar epithelium enclosing homogeneous colloid mass. The tumor was identical with normal thyroid tissue.

The thyroid gland was not enlarged and there were no accessory thyroids. No microscopic examination was made.

CASE 9 M B a male 34 years of age was operated on for acute appendicitis 8 months before his admission to the hospital. After he had been at home for a short time he noticed some soreness in the right side of the abdomen with an occasional sharp pain especially on sneezing or coughing. On several occasions he became deeply jaundiced and continually suffered from nausea vomiting poor appetite and loss of weight. Examination showed the patient to be emaciated and somewhat jaundiced. The liver was enlarged and tender. The right upper abdomen was somewhat rigid. The temperature was 100.5 degrees F the pulse 104 respiration 24 urine negative white blood cells 10 200. At operation (Dr C H Frazer) the abdomen was opened through a right rectus incision. The liver presented a rounded mass in the right lobe about 5 centimeters from the lower border. An aspirating needle inserted in this area obtained pus. An inch of an overlying rib was resected and about 30 ounces of pus aspirated. The abscess cavity was packed with gauze and one rubber tube drain was inserted. Three pieces of gauze were packed between the liver and the abdominal cavity and the abdominal wound closed with drainage. The patient's postoperative course was uneventful. The temperature reached normal 1 day after operation and he was discharged on the seventh day to be dressed by the family physician.

CASE 10 A M a male 25 years of age had a history of several attacks of lower right abdominal pain and finally of an appendectomy 8 months before admission. His condition did not improve and 2 months later he was admitted to the hospital where a subdiaphragmatic abscess was found and drained. He improved somewhat and left the hospital against advice. He returned 5 months later with a draining sinus but again left before he could obtain proper treatment. After a month had passed he returned once more. He had a temperature of 104.07 degrees F with chills pain and tenderness in the upper right abdomen and moderate jaundice white blood cells 17 200. On the day of his admission he was operated upon (Dr J B Carnett) through a right rectus incision. A large liver abscess was found projecting upward beneath the right diaphragm. An opening was made above for drainage via the subdiaphragmatic tract previously opened and one below for drainage through the abdominal incision. The patient improved somewhat for a time but about 3 months later he began to show a high temperature and developed pain in the region of the liver. The abscess cavity was opened and drained again but the patient failed to improve and died 3 weeks later. Necropsy was refused.

CASE 11 C W a male 22 years of age was admitted to the hospital with the chief complaint of chills and fever. Ten months previously he had an attack of lower right abdominal pain with vomiting and fever and was treated as a case of typhoid fever for 22 weeks (Probably appendicitis). He was not benefited however and began to have chills fever

and upper right abdominal pain. Six months after the onset of his trouble he was operated on. Mucus and a few gall stones were found in the gall bladder which was drained. He continued to show a remitting type of fever and had lost considerable weight. On admission his temperature varied between 95 and 104.5 degrees. His liver was found somewhat enlarged and there was a sense of resistance and some tenderness in the right upper abdomen. He was slightly jaundiced. White blood cells numbered 18 000. Urine showed bile pigments. The fluoroscope showed a high right diaphragm. At operation many adhesions were found and separated. The liver was enlarged and there was a marked edema of the gastrophrenic omentum with many enlarged lymph nodes. The common duct was drained and a cholecystectomy performed. The day following operation the patient had a severe chill and 2 days later a distinct jaundice was noted in the skin and sclera. Edema of the lateral abdominal wall with dilatation of the skin capillaries was noted on the tenth day after operation and the fluoroscope showed the diaphragm to be high and fixed. An aspirating needle was inserted in the ninth interspace in the posterior axillary line and thick foul pus was obtained. The opening was enlarged along the needle and about 8 ounces of pus evacuated. Drainage was inserted and the cavity packed with gauze. When the pus was found the common duct tube was removed. The day following the abscess drainage he became delirious the jaundice was very deep and he refused food. He died 5 days later. At autopsy a well walled off solitary abscess cavity was found occupying a greater part of the right lobe of the liver. On the upper portion the abscess wall had become very thin and was almost ready to rupture into the subphrenic space.

CASE 12 M I a male 31 years of age after 2 1/2 weeks of abdominal pain fever and nausea was seen by Dr Alfred Stengel who diagnosed an acute appendicitis with abscess. He was sent to the hospital and operated on at once. The appendix was found acutely inflamed and the abdomen containing seropurulent fluid. An appendectomy and drainage had been done elsewhere. The recovery was normal except for a slight elevation of temperature which was attributed to a stitch abscess. Two weeks after the operation the patient was allowed out of bed for the first time and while sitting quietly in his chair was suddenly taken with acute abdominal pain which continued and became localized in the lumbar region on both sides. When admitted to the University of Pennsylvania Hospital his pain had continued for 6 weeks accompanied by fever of the hectic type and profuse sweats. Pain was constant worse after meals often associated with a bloating sensation and not well localized but mostly on the right side of the abdomen. He had vomited several times had had no chills and had no appetite. He was slightly jaundiced. On examination his chest seemed normal. The abdomen gave an indefinite sense of resistance and marked tenderness especially

This patient's neck was much deformed especially on the right with no enlargement of the cervical nodes. Swallowing of solid substances became difficult. At autopsy the thyroid was found much enlarged with many encapsulated adenomata. Microscopically there was no indication of malignancy.

CASE 68. Schmidt (68). A woman 57 years of age for 3 years had had a tumor the size of a hazel nut at the lateral aspect of the left clavicle with recent accelerated growth. The regional lymph nodes were not enlarged. The growth was extirpated. Microscopically the appearance was that of benign goiter. After several searches a carcinomatous infiltration of the capsule was found. Death followed a few weeks after operation.

The thyroid glands were clinically normal in appearance. *No microscopic examination and no autopsy was made.*

CASE 69. Schräger (69). In this case a penuteral thyroid metastasis was found at operation for ureteral stricture. It was thought to be a benign metastasis. Microscopically it was typical thyroid tissue.

No abnormalities of the thyroid gland were mentioned. *No histologic examination. No autopsy.*

CASE 70. Gavel (70). A man about 40 years of age had been subjected to a previous operation on the pelvis for sarcoma. A recurrence was treated with Coley's toxins with no effect on the size of the tumor. Death was from exhaustion. The tumor involved the left greater trochanter of the femur and the left and right sacro-iliac synchondroses. The tumor was pulsatile and compressed the bladder and rectum with ulceration of the overlying skin. Microscopically the tumor was typical thyroid tissue with alveoli filled with colloid.

No symptoms were referable to the neck. *No examination of the thyroid was made.*

CASE 71. Walther (71). A woman 49 years of age had an occipital tumor which was diagnosed sebaceous cyst. Extirpation was followed by recurrence and a second operation. A tumor 5 centimeters in diameter was found implanted in the occipital region attached by a pedicle to the dura mater. Microscopically the tumor was characteristic thyroid tissue.

The thyroid gland in the right lobe was hard and irregular. There was another large tumor in the left sternomastoid region apparently independent of the thyroid. These growths were not removed. *No microscopic examination was made and the outcome was unknown.*

CASE 72. Wilkens and Hedren (72). The patient was a woman 72 years of age. Seven years previously tumor had appeared in the temporal region and on the summit of the cranium which grew to the size of an adult head. It was fluctuant pulsatile. The only subjective symptoms were a buzzing in the ears and a slightly obscure vision. Cachexia was followed by death. A diagnosis was made of vascular osseous tumor. *Autopsy.* Cranial tumors had developed in the bone. On section they were grayish white with ecchymotic spots. A similar tumor was in the second third and fourth dorsal vertebrae. Microscopically the tissue was embryonic thyroid with polymorphous cellular elements rich in chromatin. The appearance was that of carcinoma.

A recent augmentation of thyroid was diagnosed goiter. It reached apple size and was firm and resistant. At autopsy the right lobe was found to contain a cyst of nut size with a fibrocalcereous wall containing a chocolate colored fluid. Microscopically it was a simple adenoma. In part colloid in part made up of small cellular nests of embryonic type. There was no evidence of atypical carcinomatous proliferation.

CASE 73. Wöelfel (73). A woman 57 years of age had severe headaches followed by the appearance of a tumor

of the left frontal bone. In one year it had reached goose egg size. Extirpation was followed by healing. The patient died during the same year. Microscopically the tissue was typical goiter. Interacinar adenoma of thyroid gland with no evidence of malignancy. (The accompanying drawings show many solid cell nests.)

In the left half of the thyroid a hard tumor which reached fist size appeared before the thyroid tumor. There was occasional pain on swallowing. (The menses stopped simultaneously with the appearance of the thyroid tumor followed by periods of hamaturia at intervals of 6 weeks.)

No microscopic examination. No autopsy.

CASE 74. Zadek (74). A man 56 years of age experienced pain and lameness following a fall. The X-ray showed a rarefied area at the base of the femoral neck. Sixteen months later a pathological fracture occurred. A large cavity filled with reddish tissue was curetted out. Microscopically it was thyroid adenoma. Aberrant thyroid. Seventeen months later hemorrhage from the site of the fracture was followed by death.

Physical examination showed the thyroid to be normal. *No microscopic examination and no autopsy was made.*

CASE 75. Zahn (75). A woman 33 years of age had had left sided facial palsy and deafness 13 months previously. Eleven months later weakness coldness and lormication of the lower extremities were followed by paralysis. There was anesthesia below the umbilicus. The Babinski reflex was present together with urinary incontinence emaciation and a sacral decubitus. There was a pulsating tumor at the level of the ninth rib to the right of the vertebral column. *Autopsy.* A nodular nut-sized tumor of the temporal and occipital bones involved the middle ear the facial acoustic and hypoglossal nerves with pressure on the cerebellum. There were constriction of the left transverse sinus and direct extension of new growth into the jugular vein. Another tumor of the skull was found near the carotid canal. Kyphosis could be noted at the level of the seventh cervical vertebra. A soft fluctuating tumor the size of a chicken's egg involved the eighth to the tenth thoracic vertebrae entered the spinal canal and compressed the spinal cord. Near the costochondral junction of the third right rib was an irregular tumor. There were similar tumors at the costochondral junctions of the second and third left ribs. Microscopically all tumor showed similar architecture. At the periphery was an acellular connective tissue capsule. Small alveoli were filled with cells or a homogeneous mass and surrounded by round cubical and cylindrical cells. Regressive metamorphosis was not seen.

The thyroid gland was normal in gross appearance. The left lobe was somewhat enlarged. The right lobe contained cherry sized adenomata. Microscopically both lobes showed simple hypertrophy with colloid degeneration. The nodules were simple adenomata.

CASES 76 and 77. Zappelloni (76) reports 2 cases of osseous thyroid tumor. There were no signs of goiter or of thyroid cancer. *No autopsy was performed and no histological examination made.*

CONCLUSIONS

1. The original observations of supposed metastases of normal thyroid tissue by Cohnheim and by Morris have been widely quoted and have influenced many others to report somewhat similar cases.

2. Cohnheim's case report of 'Simple Colloid Goiter with Metastasis' contains

An enterostomy was done in the distended gut and the abdomen drained. After a stormy convalescence the patient completely recovered and is now back at her occupation of nursing. Diagnosis: pylephlebitis, abdominal abscesses, and intestinal obstruction.

SUMMARY

1 Pylephlebitis and liver abscess are not identical and occur as a complication in from 0.1 to 0.4 per cent of cases of appendicitis.

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9 Operation through the diaphragm is the treatment of choice.

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An entero tomy was done in the distended gut and the abdomen drained. After a stormy convalescence the patient completely recovered and is now back at her occupation of nursing. **Diagnosis:** pylephlebitis, abdominal abscesses, and intestinal obstruction.

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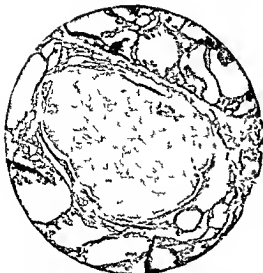


Fig. 1. Microscopic section of a parathyroid gland imbedded in a hyperplastic thyroid which has been converted to involution by iodine.

The lobes should be carefully sponged with out roughness immediately after they are removed. The parathyroids may be distinguished by their characteristic brownish color in moderate contrast to the reddish color of thyroid tissue by the fact that by gently moving them from side to side they may be demonstrated as attached to but not a part of the thyroid and by their fairly typical bean shape with a thickness of only half their length or width.

When they are demonstrated they are gently cut from the gland care being taken to see that little or no thyroid tissue is taken with the parathyroids and that the bodies are not picked up by instruments. They should be so cut away from the gland with scissors that the gland rests upon the blades of the scissors until it is ready for transplantation.

After we have made sure that there is no attached thyroid tissue a hole is made in the belly of the left sternomastoid by inserting the points of a pair of blunt scissors deeply into the muscle and gently spreading them apart. If the cavity thus made is dry the parathyroid is placed within it and the opening closed with two or three stitches of plain

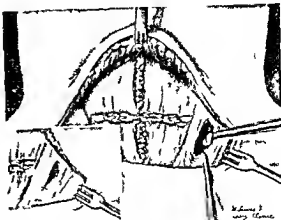


Fig. 2. Showing method of transplanting parathyroid into sternomastoid muscle. Insert showing closure of muscle over transplanted gland.

No catgut. It is essential that the cavity be dry as shown by Marine and should a small vessel be ruptured on spreading the scissors apart they should be inserted at another location and a dry cavity obtained.

CONCLUSIONS

Since parathyroids will occasionally be removed at operation and identified in the laboratory they should be carefully searched for on the specimen following operation and if found transplanted.

The belly of the sternomastoid is the most convenient place into which to transplant them and care should be taken to see that the cavity into which they are transplanted is dry.

Since this article was sent for publication twenty-six additional possible parathyroids have been transplanted and a plan of taking a small section from each transplant has been instituted. This is sent to the laboratory for report as to whether or not the transplant actually is or is not a parathyroid. It is of interest to note that out of twenty-five bodies transplanted as possible parathyroids four have actually been proven by histological examination to have been parathyroids; two were reported possible parathyroids and nineteen were not parathyroids but probably lymph glands.

This note is appended to demonstrate the difficulty of recognizing parathyroids macroscopically and the need of microscopic report to determine in which cases parathyroids have actually been transplanted.

emptying the uterus from below and then subjecting the patient to X ray or radium. This is of value in women approaching the menopause, but should not be used in young women because of the sudden artificial menopause it causes. I will just mention in passing repeated curettage without sterilization. This is merely a palliative measure and is entirely inadequate. It involves the subjection to repeated anaesthetics and operative interferences which may prove disastrous.

Abdominal hysterotomy with sterilization is performed only on women who are exceedingly poor surgical and anæsthetic risks. The characteristics of what might be called the ideal operation for these cases are the following:

- 1 The procedure must be sufficiently simple to come within the surgical skill of even the occasional operator. In other words it should not be more difficult than a simple appendectomy.

- 2 The blood loss should be reduced to the absolute minimum.

- 3 Sterilization must be complete.

- 4 The operation must require very little time for its completion.

- 5 The anatomical or structural relationships must be disturbed as little as possible so that

- 6 The operation can be done under ether, gas, local or spinal anaesthesia with equal facility.

The technique which I have followed for the past 4 years fulfils all these requirements and can easily be done by the average gynecologist or surgeon within the half hour under any form of anaesthesia.

A mid abdominal incision is made from an inch or two below the umbilicus to the symphysis. The uterus is seized by a tenaculum brought out of the abdomen, and then well walled off by lap sponges. A 4 or 5 centimeter incision is made in the midline beginning at the fundus and extending toward the cervix through all the uterine coats. The membranes usually bulge through the incision and are ruptured. The embryo and placenta are detached and removed with a gauze wrapped finger or a sponge stick forceps introduced into the cavity of the uterus. Here a little diffi-

culty is encountered because the spongy layer of the decidua is not fully developed and does not separate easily. There is little bleeding from the placental sinuses. The delivery of the membranes and the placenta is followed by an injection of 1 cubic centimeter of pituitrin directly into the uterine musculature. This contracts the uterus fairly well. A continuous suture of No. 2 plain catgut brings the musculature of the uterus together but does not take in the endometrium. A second seromuscular layer of continuous No. 2 plain gut followed by a pentonealization of the raw surface closes the uterus firmly preventing any possible leakage. The tube is now grasped by an artery clamp at its isthmus portion and picked up so that a knuckle is formed. A fine needle carrying silk is passed under the tube at the apex of the knuckle and tied first over one limb and then over the other. The apex of the knuckle is cut off with the scissors and both raw surfaces are cauterized by thermocautery or carbolic and alcohol. The same is repeated on the other tube. A rapid inspection is then made and the abdomen is closed. The operation is followed by as little post operative inconvenience as that following an interval appendectomy. In my series of cases very little pain was experienced and the temperature never rose to over 100.5 degrees F. The patients were returned to the care of the medical men on the tenth or twelfth day after the operation. During convalescence very moderate vaginal bleeding due to the throwing off of small placental rests is a common finding. Not a single one of my cases showed any morbidity.

The operation can be done at any time during the pregnancy.

In the early months a 2 inch abdominal incision just large enough to admit two fingers may be adequate for the entire operation.

The anterior uterine incision has the advantage over the posterior one in that while the latter may cause adhesions to either the omentum or the intestines the former may cause adhesions to the bladder or to the anterior abdominal wall, which only serve to suspend the uterus. The above method of treating the tubes is better than any type of resection inasmuch as it does not interfere

destroyed in the liver tissue resulting in a chromatolysis and vacuolization of the liver cells with the formation of free pigment. Coincidentally there is an invasion of round cells with the ultimate result of a small area of necrosis later replaced by fibrous tissue. This probably explains the recovery in such cases as Case 1 of this series.

In several places in the literature on this subject pylephlebitis is spoken of as synonymous with pyæmic abscesses of the liver. The writer takes exception to this terminology. It may be true in cases of multiple abscesses but not true in single abscesses. In other words we may have a localized pylephlebitis or a diffuse pylephlebitis without a liver abscess (Case 4) or we may have either with a single or with multiple abscesses or there may be no demonstrable pylephlebitis yet a liver abscess may be present (Case 7). The mesenteric veins as well as the omental veins must be considered as carriers of infection into the liver. The omentum is peculiar in its vascularity containing many converging veins of great length with their walls easily wounded. Eiselsberg demonstrated how rapidly these veins are thrombosed after operation and Wilkie also showed the ease with which injury and thrombosis of the portal vein occurred. By mere ligation of the omental veins he produced punctiform hemorrhage in the stomach in 30 per cent of the cases and hemorrhagic infarcts in the liver in 50 per cent. If aseptic thrombi in omental veins showed these pre eminent tendencies toward upper abdominal embolism how much greater must be this embolic tendency in a septic thrombosis as occurs in acute appendicitis cases. These facts may explain two things: first why liver abscesses sometimes occur without mesenteric phlebitis and second why the draining of the omental veins into the gastric vein which in turn drains mostly into the left lobe accounts for left lobe involvement.

INCIDENCE

Schlesinger states that Stillman in a study of 1 748 cases of appendicitis found that complications occurred in 7 per cent and of these only 2 (0.14 per cent) were cases of liver abscess. Rendle Short according to Barlow

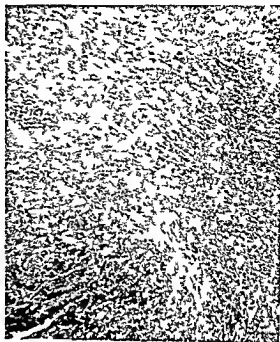


Fig 1. Case 1. Section of liver tissue removed at autopsy showing small abscesses grouped around small portal radicles.

found that suppurative phlebitis occurred in 0.4 per cent in a series of 2 714 cases. Gerster reported in a series of 1 189 cases of appendicitis an incidence of 9 cases of pylephlebitis. Krogins quoted by Babler had only 2 in 1 000 cases of appendicitis. He also states that Bell had 8 cases in a series of 1 726 appendicitis cases. Schlesinger in 1924 collected records of all such cases and found but 23 reported of which 20 patients were known to have recovered by operative treatment. A careful examination of the literature discloses at least 30 more cases with a reported recovery of only 7. This makes the series total 53 cases with 27 deaths (59 per cent mortality). It seems rather difficult to explain 20 recoveries in the 23 cases collected by Gerster as compared with only 7 recoveries in the 30 cases collected in this paper. The total number of cases that have been found reported to date is 53 (see bibliography). It is true that the diagnosis in some of these cases was not confirmed by operation or autopsy. Furthermore in a few instances the diagnosis was that of pylephlebitis with the assumption

three months pregnant suffering from marked symptoms of a breaking cardiac compensation as associated with mitral stenosis. With her previous pregnancies her heart had been bad. In the medical consultant's opinion the condition of her heart was such that pregnancy was a distinct menace to her life. Anterior abdominal hysterotomy with sterilization was performed March 20, 1924, under gas-oxygen anesthesia. On the day after the operation the temperature rose to its highest point 100.5 degrees F. After that it remained normal. The patient had a slight infection of the upper angle of the wound. On her discharge on April 6, 1924, the cardiac action showed improvement, more regularity and a better quality to heart sounds. The examination of the pelvis was negative.

3. *Chronic nephritis and hypertension.* In the glomerular type of nephritis, if it is known that the glomeruli are wanting in regenerative power and that the disease is little affected by medication and treatment and if hypertension is present, there can be no question as to the advisability of interrupting pregnancy with sterilization.

If the kidney is nephrotic, sterilization is indicated only when it is found that each pregnancy causes an acute exacerbation and the development of vascular changes. The chronic hypertension of the nephritis calls for a special indication because of its effect on the cardiac condition. Labor entails a relatively sudden increase of blood pressure, sometimes as great as 50 millimeters. This is illustrated by the following case:

CASE No. 12195. R. L., age 23, was admitted to the Brownsville and East New York Hospital complaining of headache and vomiting.

The history showed that she had been married two years. The first pregnancy advanced to 6 months when uterine symptoms developed and a premature delivery was necessitated. Labor was induced by catheter and packing, now pregnant about 6 months. The medical diagnosis was acute exacerbation of a chronic nephritis.

The urine examined between the first and second pregnancies had always showed albumin and casts. The blood pressure was always above normal. The physical examination on admission showed that she was suffering from a slight cardiac enlargement, a blood pressure of 214/140, the urine boiled solid and showed granular casts and red blood cells. Ophthalmological examination showed both disks and rest of fundus with moderate amount of edema. In both the macular and paramacular regions were a number of small dot-like retinal exudates. The retinal blood vessels exhibited no evidence of sclerosis.

In consideration of her behavior during the last pregnancy, the history of hypertension and albumi-

nia between pregnancies and the present findings, termination of pregnancy with sterilization was considered advisable.

Anterior abdominal hysterotomy with sterilization was done three days after admission under local anesthesia induced with $\frac{1}{2}$ per cent novocain. The postoperative course was uneventful and the patient was transferred to the medical service on the tenth day. The blood pressure was 190 and only a trace of albumin was present in the urine.

4. There remain only the unusual cases which will merely be mentioned since they only occasionally require the treatment under discussion. These are cases of (a) recurrent toxemia, (b) complicated diabetes, (c) certain nervous and mental diseases such as chorea, (d) blood diseases such as pernicious anemia and leukemia, and (e) severe thyrotoxicosis. These cases do not permit of a generalizing law. Each one must be judged on its own merits.

When it is first presented this method of abortion with sterilization per abdomen seems to be a very radical procedure. However, experience with it soon demonstrates that in the indicated cases the patients stand the operation very well and recuperate rapidly. No operator either here or abroad has reported any mortality attributable directly to the operation itself. This is noteworthy when we consider the fact that the women they had to deal with were all very sick. The technique which I have followed and described to you fulfills all the requirements in that it is simple, entails very little blood loss, it is certain to sterilize, is time saving, and any kind of anesthetic can be used. The diagnosis of the conditions I have outlined specifically indicates this operation as definitely as the diagnosis of an ectopic pregnancy indicates salpingectomy.

SUMMARY

The operation of hysterotomy for the interruption of pregnancy and sterilization is of great value in certain cases of pulmonary tuberculosis, cardiac diseases, chronic nephritis and hypertension, and some unusual cases, and could be used to the patient's advantage much more often than has been the practice in this country.

Let me here publicly thank Drs. Gordon, Frucht, Dattlebaum, and Harris who have kindly given me their views as to the pathological conditions that form the basis of the indications for operative procedure.



Fig 3 Case 4 Before drainage of abscess. Right diaphragm high and fixed. Left diaphragm restricted in movement. Shadows at each base.



Fig 4 Case 4 Showing hydropneumothorax right side after rib resection and drainage of liver abscess of right lobe.

polymorphonuclear increase. In the pre-operative counts the highest was 29 000 and the lowest was 10 200. An interesting finding was observed in the course of Case 7. Widal's haemoclastic test was positive for liver tissue destruction. The leucocytes dropped from 19 600 to 10 600. These high counts persist until relief is given by drainage of the liver focus.

Pain is not a constant symptom as it is absent or at least not mentioned in many of the case reports reviewed in the literature of the last 10 years. However when it is present it is located in the right upper quadrant, is dull and at times pleuritic; at other times it is a dull ache under the shoulder blade. The presence or absence of pain cannot be regarded as of paramount importance in the diagnosis. It was complained of by 5 patients in this series. Multiple abscesses were present in all 5 cases and in 3 a pathological condition in the chest was evidenced by friction effusion, and an X-ray shadow in the lower right chest.

Icterus Jaundice is almost invariably present and appears early in the course of the infection. In fact its appearance in the pa-

tient early in the attack of appendicitis will often lead to the erroneous diagnosis of a gall bladder disease, the acute appendicitis being entirely overlooked (Case 5). At times a slight icteroid tinge to the sclera may even precede the postoperative appearance of the warning chill. On the other hand jaundice may be so slight as to escape the examiner's notice entirely, even though the urobilin appears in the urine.

Tenderness This finding is always present and can be elicited if the hunt is sufficiently careful. It is found over the right lobe of the liver as a rule and can be produced by the fist percussion of Murphy. If the abscess is single and situated as it frequently is on the under surface near the anterior border of the liver, the tenderness can be found by simple palpation. Finger percussion above the tenth rib in the midaxillary line produced pain and tenderness in 11 of the 12 abscess cases, there being no liver tenderness in the 2 cases of pylephlebitis without demonstrable abscesses.

Edema In 11 of the cases a localized firm or boggy edema was noticed over the region

uterus may be easily and well drawn through into the vagina so that the bladder will lie smoothly not in folds and the base be not elevated on the posterior surface of the fundus uteri. For unless these precautions are taken the patient will be very uncomfortable and will complain of symptoms pointing to an irritable bladder.

In almost all of these cases residual urine containing pus bladder epithelium and colon bacilli will be found and cystoscopy will show a chronic trigonitis. This ought to be cured before operation and it can easily be done in a few days by keeping the patient in bed by thoroughly emptying the bladder with

a catheter twice a day irrigating the bladder with a 4 per cent solution of boric acid and after thoroughly draining the bladder instilling into it 2 ounces of a 1:1000 solution of mercurochrome—220 soluble.

For the following reason the bowels are not moved for 7 days. Even though the greatest care is exercised in giving an enema and in cleaning the anus and parts about after defecation the perineum becomes a little soiled and the perineal sutures may thus become an easy prey to the micro-organisms present.

The kind of diet for the 7 days is such that there is no accumulation of feces in the rectum.

THE CLINICAL APPLICATION OF RECENT STUDIES ON JAUNDICE

By ALBERT M. SNELL, M.D., ROCHESTER, MINNESOTA
D. U. 1 Metel. M. y. Clinic. 4 Th. M. y. F. dist.

WITHIN the last decade there has grown up a voluminous literature on the subject of diseases of the liver particularly those associated with icterus. Newer knowledge of the physiology of the organ has necessitated a readjustment of many previous conceptions of hepatic diseases and has stimulated the interest of biochemists, physiologists, surgeons and internists. In this paper I shall review some of the more important recent work on the subject and discuss its clinical application.

The term jaundice implies a staining of the body tissues and fluids with bile pigments. Bilirubin and its oxidation product, biliverdin, the principal pigment substances in human bile were formerly believed to be elaborated by the polygonal hepatic cells. While Morgagni taught that the liver acted only as an excretory organ with regard to bile it was not until the work of Virchow, in 1847 that attention was called to the possible formation of bile pigment outside the liver. The latter's observations on the formation of a substance resembling bilirubin at the site of old hemorrhagic extravasations laid the foundations of modern conceptions of jaundice.

Virchow's classification of jaundice as hepatogenous and anhepatogenous was quite generally accepted until the publication of the work of Minkowski and Naunyn in 1886. They administered the powerful hæmolytic substance arsenureted hydrogen to geese from which the livers had been removed believing that if bile pigments were formed from broken down hæmoglobin bilirubin could be detected in the blood serum after such marked destruction of blood. Since they were unable to demonstrate the presence of bile pigments after this procedure they concluded that jaundice could be only of hepatogenous origin. Eppinger in 1908 contributed to this belief by a statement (since retracted) that all jaundice of whatever type was dependent on obstruction to the flow of bile whether this occurred in the common duct or the finer biliary capillaries.

Recently conclusive evidence has been brought forward supporting Virchow's original hypothesis of the extrahepatic formation of bilirubin. Whipple and Hooper demonstrated the formation of bile pigment in animals after the hepatic circulation had been greatly diminished by anastomosing the portal vein to



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Fig 4 Case 4. Showing hydropneumothorax right side after rib resection and drainage of liver abscess of right lobe.

polymorphonuclear increase. In the preoperative counts the highest was 29,000 and the lowest was 10,200. An interesting finding was observed in the course of Case 7. Widal's hemoclastic test was positive for liver tissue destruction. The leucocytes dropped from 19,600 to 10,600. These high counts persist until relief is given by drainage of the liver focus.

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polygonal liver cells is reabsorbed by the blood stream and lymphatics. This type of jaundice is described as 'obstructive'. If there is an abnormally large production of bilirubin or its precursors within the body or if there is an impediment to the passage of this substance through the endothelial lining of the hepatic capillaries bilirubin will accumulate and enter the general circulation without being passed through the hepatic cells proper. This type of jaundice is referred to as hemolytic. Finally if there is hepatic damage functional or otherwise not only may normally formed bilirubin fail of excretion but also that which has passed through the polygonal cells of the liver may be reabsorbed. This is the type of jaundice described as toxic or infectious. McNee (15) therefore following Osler and Rolleston proposes that jaundice be classified into three clinical varieties obstructive hemolytic and toxic or infectious.

The studies of van den Bergh furnish an interesting corollary to the foregoing hypothesis and incidentally constitute a most important addition to our knowledge of icterus. By developing the well known Ehrlich diazo reaction and adapting it to the estimation of bilirubin in serum he has produced the most delicate chemical method yet available for this test and centered interest in icterus on the amount of pigment in the blood rather than on that noted in the skin and excreta. His method may be briefly stated as follows: on the addition of Ehrlich's diazo reagent to serum, in the presence of obstructive jaundice a purple color appears immediately. This is called the 'direct' reaction. In certain instances particularly in toxic jaundice the color appears slowly the reaction then being 'delayed' or 'biphasic'. On the addition of alcohol, a rose colored azobilirubin is formed he terms this the 'indirect' reaction. The amount of azobilirubin formed in the latter reaction can be estimated colorimetrically and the amount of bilirubin in the circulating blood calculated. Normal human blood contains from 0.5 to 2.0 milligrams of bilirubin for each 100 cubic centimeters as shown by the indirect reaction. This test permits the exact estimation of the degree of bilirubinemia.

Van den Bergh has investigated the point further and believes that chemically pure bilirubin and that obtained from the gall bladder and bile passages are somewhat different substances. The direct reaction is only given by the latter whereas the former requires the addition of alcohol for the development of any color whatever. He interprets this as the result of changes in the substance probably occurring during its passage through the polygonal hepatic cells. By adapting van den Bergh's view to his own theory McNee (15) has suggested that a direct reaction is diagnostic of obstructive jaundice that the indirect reaction is obtained in all types as well as in normal human serum and that a biphasic or delayed type of direct reaction would be expected in cases of jaundice of toxic or infectious origin.

In the experience of many continental investigators this differentiation seems to work out fairly well. My own studies with the method are not so conclusive. Without discussing the matter in too much detail it would seem that direct reactions are obtained in high degrees of jaundice from whatever cause possibly increased viscosity of bile with the formation of obstructing bile thrombi (as suggested by Lippinger 8) may play a part. I have also noted the accumulation of bilirubin giving the indirect reaction in animals with obstructive jaundice prior to the appearance of the direct reaction. I have felt that a sharp differentiation of obstructive and non-obstructive jaundice was not always possible on the basis of van den Bergh's test alone. The time honored examinations of the urine and stools for bile pigment are still of great value in this connection. The quantitative estimation of bilirubin in the blood however is of the greatest clinical and scientific value.

The retention of substances other than bilirubin complicates the clinical picture of jaundice caused by occlusion of the biliary passages. Chief among these other constituents of bile are the bile acids glycocholic and taurocholic their effect on the organism is undoubtedly most important. The present knowledge of the physiology of bile acids is very limited they are however probably formed exclusively by the hepatic cells. Their chologogue

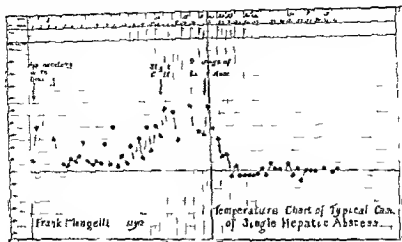


FIG. 7. Case 7. Chart showing typical temperature curve of patient with single hepatic abscess.

shadow appeared only in those cases in which the abscess or abscesses affected the upper surface of the liver.

These X-ray findings are extremely interesting as they seem to point to the fact that pus in the liver will give much the same phenomena as will subdiaphragmatic pus. In Cases 1, 4, and 13 there was an abscess between the diaphragm and the liver but it was a result of a rupture of a liver abscess into this space as shown at operation the condition being then one of the hourglass type of abscess.

It may be stated here that in practically all of these cases the clinical diagnosis at first was a basal pneumonia or a subdiaphragmatic abscess. Before operation however in each instance the proper diagnosis of liver abscess was made.

Urinalysis. Urobilin was found in the urine in 5 of the cases. It is not mentioned in the other records.

Cultures. Cultures were made in 8 cases of the series. In 4 cases the organism was streptococcus, in 3 staphylococcus, and in 1 bacillus mucosus. In 1 the culture was sterile. In only 1 was a colon bacillus found. Blood cultures were sterile in the entire group.

NUMBER OF ABSCESSES

In 7 of the 12 cases (58 per cent) only a single abscess was found. These figures are very interesting in view of the fact that they

agree with the facts as obtained from foreign literature but are not in accord with the statements of many American surgeons some of whom state that the fact that the abscess is single and the patient recovers proves it not a liver abscess but a subdiaphragmatic collection. Solitary abscesses were all in the right lobe, most often in the lateral aspect of the dome. One only was on the under surface.

AGE OF PATIENTS

The oldest patient was 67 years of age, the youngest one with abscess was 13 years old, while the youngest one with pylephlebitis was but 7 years of age. As would be expected the occurrence is more frequent in the period of appendicitis prevalence, namely in young adult life. Only 2 patients were beyond 45 years of age.

MORTALITY

Seven of the 14 patients lived (50 per cent). This is not as high a recovery rate as that quoted earlier in this article from the cases collected by Schlesinger, namely 20 recoveries in 23 cases. However it more nearly approximates the mortality rate (50 per cent) of the entire number of cases, 53, collected by the writer from the literature at the time of writing. Adding the present series of 14 cases with 7 deaths we have an average mortality of 54.5 per cent. This gives one pause as many

and type of cirrhosis depend on the virulence of the toxin and its method of entry. Obstruction of the common duct produces biliary cirrhosis with the primary proliferative changes occurring in the region of the biliary capillaries, the cirrhosis due to alcohol copper pepper and other irritants absorbed from the intestinal tract by way of the portal vein shows a primary change in the vicinity of the portal capillaries.

In cases of toxic or infectious jaundice the initial damage occurs in the polygonal hepatic cells themselves all degrees of pathological change from simple cloudy swelling to actual necrosis being observed. The portal spaces and biliary capillaries are only secondarily affected. The relationship of cirrhosis to jaundice of this type is obviously of great clinical interest. McNee (14) and others have suggested that all the changes observed in such conditions ranging from simple hepatitis to acute yellow atrophy and cirrhosis of high grade are all part of the same pathological process. This point is well illustrated by the hepatic changes observed in syphilis. The combination of salvarsan and syphilis may produce all of these grades of hepatic damage from the mildest to the most severe. Cases have been observed to progress from the stage of mild transient jaundice to a terminal *hepar lobatum* with ascites. Exactly similar observations have been made in cases of poisoning with trinitro toluene and tetrachlorethane the pathological process progressing gradually over a period of years. I have had the opportunity of studying several cases of toxic jaundice of unknown origin in which no obstruction of the bile passages could be demonstrated in these cases the development of definite cirrhosis was confirmed by biopsy made at the time of exploration. The conception of a progressive hepatitis with variable degrees of jaundice and increasing cirrhosis is of the greatest interest to the surgeon and internist.

Continental physicians notably Eppinger (9) have been much interested in the relation of the reticulo endothelial system to hepatic and splenic disease. The cirrhosis associated with splenomegaly Banti's disease and certain types of biliary cirrhosis have been considered as liver spleen diseases (9) and

the improvement following splenectomy explained on the basis of a removal of a functional overload on the liver. W. J. Mayo has said that certain splenic diseases, involving as they do the reticulo endothelial system, may cause the elaboration of toxic substances which when carried to the liver by the splenic vein produce splenic types of hepatic cirrhosis. He has also demonstrated that splenectomy is of considerable benefit in selected types of biliary cirrhosis as well as in portal cirrhosis associated with ascites.

Prolonged coagulation time has long been known to be a fairly constant finding in cases of obstructive jaundice and hemorrhage was formerly one of the most feared postoperative complications as well as the chief cause of a high surgical mortality. The use of calcium chloride intravenously as advocated by Walters has served to reduce very greatly the occurrence of such hemorrhages. Since the general adoption of his method there has also been a marked decrease in operative mortality following surgical procedures in jaundiced patients. The cause of prolonged coagulation time in cases of icterus still remains obscure. In cases of both clinical and experimental obstructive jaundice it is known that the serum calcium is constantly within normal limits while the blood fibrinogen content is normal or even increased. It has been suggested that a chemical union between the blood calcium and some constituent of the retained bile may exist rendering the calcium inert and incapable of performing its usual function in the coagulation of blood. Such a union however has not been satisfactorily demonstrated.

A recent revival of interest in studies of hepatic function has resulted in a number of interesting observations on its relation to jaundice. A group of us at the Mayo Clinic (10-11-30) has recently made a survey of the subject and studied certain of the more promising tests of hepatic function in cases of experimental and clinical obstructive jaundice. In the experimental series a number of these tests were performed on dogs following ligation of the common bile duct. Cholecystectomy was combined with ligation of the common duct in half of the animals used in order to hasten the development of icterus. In both groups the

his admission to the hospital. A month later he began to have chills, fever, and epigastric pain. On several occasions he had sharp attacks of pain with vomiting followed by great weakness. On admission he was very much emaciated. His chest showed a few moist râles at the base of the lungs. There was a firm bulging mass in the epigastrium which was somewhat tender and seemed to be located in the liver. He had no jaundice and his urine did not show urobilin. The X-ray examination showed high left diaphragm. The temperature was 101-97 degrees F, pulse 122, respiration 28, white blood cells 13,000. Blood culture showed no growth. (See temperature chart Fig. 2.) A diagnosis of liver abscess of the left lobe was made. Two days later the abdomen was opened through a right rectus incision and the liver was found adherent to the parietal peritoneum. Its surface was studded with small abscesses, four of which were opened with the cautery and a rubber tube drain inserted. The septic fever continued with little change in the general condition in spite of a blood transfusion and other measures. Two weeks later needles thrust through the previous wound into the liver located 3 small abscesses which were incised by cautery. After 4 days because of left-sided pain and an X-ray showing a high left diaphragm, an attempt was made to locate pus by the insertion of an exploring needle in the tenth interspace at the posterior axillary line on the left side. The pus was found and a portion of the tenth rib removed preparatory to a transdiaphragmatic drainage. The pleura was found normally thin and transparent; however, so the costophrenic angle was obliterated by sewing the lateral and diaphragmatic pleura together in an elliptical row of sutures through which the diaphragm was opened and the abscess drained 3 days later. About 4 ounces of yellow pus were evacuated. After the operation the patient remained more comfortable. The pain was less intense and a light irritating cough disappeared. The temperature curve continued to be of the septic type. However, a week after the last operation purpuric spots developed over the chest and the patient died 5 days later with asthmatic symptoms. At autopsy the liver was found dotted with small abscesses particularly over the left lobe and the cut surface showed branched abscesses extending along the portal vein (Fig. 1).

CASE 2. J. B., a male 45 years of age, was admitted to the University Hospital with a history of an acute appendicitis of 10 hours duration. At operation a gangrenous appendix was removed and drainage instituted. It was noted that the cecum and the meso-appendix were markedly red and edematous. Eleven days after a rather slow but apparently normal postoperative convalescence the patient had a chill with an elevation of temperature. This was the first of a series of chills. The temperature curve was of the septic type; the leucocytes went from 12,000 to 17,000 and slight jaundice of the sclera and face developed. Anorexia, nausea, and



Fig. 10. Case 7. Photograph of patient 1 year after drainage of liver abscess showing scars of appendectomy wound and of liver abscess incision.

vomiting became prominent symptoms so that proctoclysis had to be given. Two blood cultures showed no growth. A fluoroscopic examination of the chest was negative. The abdominal wall, especially the right upper quadrant, gave a doughy sensation to the examining fingers. Small veins were visible in the same area. The liver edge was palpable soft and not tender. Based on these findings a diagnosis was made of pylephlebitis with liver abscess 20 days after appendectomy. A medical consultant suggested the possibility of an acute endocarditis, but the negative blood culture, lack of cardiac signs, petechia, blood in urine, and other embolic phenomena made the diagnosis seem probably incorrect. A week later the abdomen was opened through a right rectus incision. From the right iliac fossa extending upward toward the pylorus and thence along the gastro-hepatic omentum was found considerable induration and edema. The mesentery was thick and somewhat stiff. The liver was enlarged and presented a chestnut-sized nodule on its under surface just to the right of the gall bladder. A needle inserted into this area obtained pus. After the rest of the abdomen had been thoroughly packed off, the abscess was opened with a cautery and drained with a rubber tube and several cigarette drains. The pus culture showed streptococcus mitis (Holman). The patient was in a state of grave toxæmia immediately

and type of cirrhosis depend on the virulence of the toxin and its method of entry. Obstruction of the common duct produces biliary cirrhosis with the primary proliferative changes occurring in the region of the biliary capillaries. The cirrhosis due to alcohol, copper, pepper and other irritants absorbed from the intestinal tract by way of the portal vein shows a primary change in the vicinity of the portal capillaries.

In cases of toxic or infectious jaundice the initial damage occurs in the polygonal hepatic cells themselves. All degrees of pathological change from simple cloudy swelling to actual necrosis being observed. The portal spaces and biliary capillaries are only secondarily affected. The relationship of cirrhosis to jaundice of this type is obviously of great clinical interest. McNee (14) and others have suggested that all the changes observed in such conditions ranging from simple hepatitis to acute yellow atrophy and cirrhosis of high grade are all part of the same pathological process. This point is well illustrated by the hepatic changes observed in syphilis. The combination of salvarsan and syphilis may produce all of these grades of hepatic damage from the mildest to the most severe. Cases have been observed to progress from the stage of mild transient jaundice to a terminal *hepar lobatum* with ascites. Exactly similar observations have been made in cases of poisoning with trinitro toluene and tetrachlorethane: the pathological process progressing gradually over a period of years. I have had the opportunity of studying several cases of toxic jaundice of unknown origin in which no obstruction of the bile passages could be demonstrated. In these cases the development of definite cirrhosis was confirmed by biopsy made at the time of exploration. The conception of a progressive hepatitis with variable degrees of jaundice and increasing cirrhosis is of the greatest interest to the surgeon and internist.

Continental physicians notably Eppinger (9) have been much interested in the relation of the reticulo endothelial system to hepatic and splenic disease. The cirrhosis associated with splenomegaly, Banti's disease and certain types of biliary cirrhosis have been considered as 'liver spleen diseases' (9) and

the improvement following splenectomy explained on the basis of a removal of a functional overload on the liver. W. J. Mayo has said that certain splenic diseases involving as they do the reticulo endothelial system may cause the elaboration of toxic substances which when carried to the liver by the splenic vein produce splenic types of hepatic cirrhosis. He has also demonstrated that splenectomy is of considerable benefit in selected types of biliary cirrhosis as well as in portal cirrhosis associated with ascites.

Prolonged coagulation time has long been known to be a fairly constant finding in cases of obstructive jaundice and hæmorrhage was formerly one of the most feared postoperative complications as well as the chief cause of a high surgical mortality. The use of calcium chloride intravenously as advocated by Walters has served to reduce very greatly the occurrence of such hæmorrhages. Since the general adoption of his method there has also been a marked decrease in operative mortality following surgical procedures in jaundiced patients. The cause of prolonged coagulation time in cases of icterus still remains obscure. In cases of both clinical and experimental obstructive jaundice it is known that the serum calcium is constantly within normal limits while the blood fibrinogen content is normal or even increased. It has been suggested that a chemical union between the blood calcium and some constituent of the retained bile may exist rendering the calcium inert and incapable of performing its usual function in the coagulation of blood. Such a union however has not been satisfactorily demonstrated.

A recent revival of interest in studies of hepatic function has resulted in a number of interesting observations on its relation to jaundice. A group of us at the Mayo Clinic (10, 11, 30) has recently made a survey of the subject and studied certain of the more promising tests of hepatic function in cases of experimental and clinical obstructive jaundice. In the experimental series a number of these tests were performed on dogs following ligation of the common bile duct. Cholecystectomy was combined with ligation of the common duct in half of the animals used in order to hasten the development of icterus. In both groups the

necropsy showed marked edema of the mesentery and gastrohepatic omentum with almost occluding thrombosis of the portal vein. The liver was enlarged and studded with abscesses of varying sizes which extended along the portal radicles. Two of these abscesses had been drained.

CASE 6. N. DeL. male 40 years of age had an attack of acute appendicitis which was treated at home by his family doctor. Two and a half months later he was taken with a grippy feeling, jaundice and dull pains in upper abdomen. He had no appetite, no nausea and no vomiting. He had occasional chills. On admission to the University of Pennsylvania Hospital he was found markedly emaciated and moderately jaundiced with rather marked rigidity of the upper recti and right upper quadrant. A tender mass was palpated in the epigastrium. The skin over the right upper abdomen was thick and several dilated veins were visible. The X-ray showed fixation of the right diaphragm and high position (Fig. 6). White blood cells numbered 21,000. Urine contained bilirubin and urobilin. A liver abscess was suggested through diagnosis. At operation the liver was found enlarged and the gall bladder was tense. When the gall bladder was opened viscid bile was obtained followed by thick pus. A cholecystostomy was performed. The patient grew steadily worse after the operation in spite of the fact that the drainage was profuse and the liver reduced in size. The temperature progressively rose to 102.6 degrees and the pulse to 136 and he died in profound toxemia a week after operation. The necropsy showed a large liver abscess communicating with many smaller ones of the branching biliary type.

CASE 7. F. M. male 13 years of age was admitted to the University of Pennsylvania Hospital after 2 days illness with diffuse peritonitis. An appendectomy was performed immediately and drainage instituted. The patient was wildly delirious with high fever for 2 days after operation but on the fourth day peristalsis returned and the temperature reached normal. Thirteen days after operation he was allowed out of bed in a chair for 20 minutes. While he was up the temperature rose to 101 degrees F. The fever persisted to the fifteenth post-operative day with daily morning remissions and evening rises with a slight chill or two (Fig. 7). A lobar pneumonia was looked for but no definite chest signs could be discovered. The right diaphragm was fixed; however there was a slight hugging of the lower intercostal spaces and some tenderness at about the tenth rib in the anterior axillary line. There were dilated veins over the lower lateral chest wall and a boggy tough edema which pitted slightly on pressure. A diagnosis of pylephlebitis or liver abscess was made. Widal's hemoclastic crisis showed

Three days later an indefinite mass could be palpated in the region of the right lobe of the liver. Rigidity of the upper right abdominal wall could be demonstrated. The lower right chest showed no expansion impairment to percussion increased fremitus and no suppressed breath sounds. The roentgenogram of the chest is shown in Figure 8. He was operated on 21 days after the appendectomy. An exploring needle was introduced below the seventh rib in the anterior axillary line into the pleural cavity. No fluid was obtained. When it was introduced downward pus was found. A piece of the tenth rib was resected and a second needle inserted into the abscess cavity. The drainage tract was enlarged with a haemostat and later with the finger. The cavity occupied the upper part of the right lobe of the liver and was the size of a lemon. The pocket was packed with plain gauze. The temperature reached the normal line 2 days after operation and he rapidly gained strength. A week after the drainage of the abscess the cavity was filled with a 10 per cent suspension of bismuth subcarbonate in sterile paraffine oil and a roentgenogram was made (Fig. 8). He was discharged before the sinus had closed which occurred about 4 weeks after the operation. He is now in excellent health (Fig. 9).

CASE 8. C. McG. male 20 years of age had severe lower right abdominal pain 10 days before admission to the hospital. The abdomen was tender and rigid. Gradually the pain grew less but shifted to the right upper abdomen. He had several slight chills and on admission his temperature was 102 degrees F, pulse 100, respiration 34. There was no jaundice and no tenderness over the liver. The leucocyte count was 26,300. A diagnosis of liver abscess was made. An exploratory laparotomy by another surgeon was performed through a right rectus incision. The liver was found enlarged but without any nodulation on its surface. No other pathological findings were reported and the wound was closed. The patient did fairly well for 2 days after operation. On the third day jaundice was noted. The white blood cells were 30,800 and he began to cough. The abdomen was markedly distended. The temperature averaged 102.5 degrees F. and he had several chills. A blood culture showed no growth. On the sixth day the wound separated when it was dressed and a second operation was necessary to close the wound. Intravenous saline solution was given. Three days later he became delirious. The temperature continued of a high hectic type with occasional chills and sweats. He showed marked emaciation and would not eat. Signs of pulmonary consolidation developed. Then of fluid at the right base. Death occurred 17 days after operation. At necropsy a gangrenous appendix was found. In duration of the mesentery extended upward toward the liver. The liver was enlarged, adherent and showed many abscesses larger centrally than peripherally extending along the portal vein. Bloody fluid was found in each pleural cavity with consolidation and abscess formation of the left lung.

W. B. C.

8:30 a.m.—19,600—before 180 c.c. milk

9:00 a.m.—17,400—½ hr. after milk

10:00 a.m.—13,300

10:30 a.m.—10,600

hepatic cells, and likewise that of a chemical combination between the bilirubin and the dyes used or of their combination with some other substance must be considered.

In an effort to cast further light on the problem I have recently administered quantities of bile intravenously to dogs, using amounts considerably less than the lethal dose. During the period of injection and for a short time thereafter there is a high percentage of retention of dye. Within 24 hours the normal hepatic function of excreting dye will be resumed. Serial sections taken during and after these injections show practically no demonstrable morphological change in the liver cells.

The experimental findings must be taken into account in the interpretation of tests involving the excretory function of the liver particularly when jaundice is present. The clinical value of dye tests for hepatic function is unquestioned; the data presented are intended simply to call attention to certain of their known limitations. It is apparently not justifiable to reckon hepatic damage when produced by jaundice particularly if it be of the obstructive type in terms of retention of phenoltetrachlorophthalein alone; the clinical aspects of the case in question must be carefully reviewed. The analogy of diminished excretion of phenolsulphonephthalein and increased blood urea in prostatic obstruction may help to illustrate this point. One expects a rapid return to normal as the obstruction is relieved, provided renal damage has not been too great. An entirely similar phenomenon is observed in cases of obstructive jaundice after drainage of the common duct is established. A failure of excretion of bile pigment after operation has almost exactly the same significance as a decreasing output of urine after prostatectomy.

In conclusion it may be said that our new knowledge of the physiology of the liver particularly that relating to jaundice has produced a definite improvement in the diagnosis and management of hepatic disease. Physiological and chemical knowledge relating to jaundice has been put to practical use. Much remains to be done along experimental lines: the fields of the metabolism of bile acid and cholesterol remaining practically un-

touched. The field for new tests for hepatic function and for a study of those already available with a view to their better interpretation is attracting the attention of investigators.

Difference of opinion between pathologists and clinicians has added to the general confusion regarding the classification of hepatic disease. It is encouraging to know that new classifications involving the more recent additions to our knowledge of the subject, are in project. The general interest augurs well for a better understanding of one of the most complex and difficult fields of medicine.

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over the right side above and external to the right rectus scar. The liver seemed slightly enlarged. The temperature was 101-99 degrees F pulse 98 respiration 20 white blood cells 14 400. The urine showed a trace of albumin and an occasional hyaline cast. Blood culture was negative. The X ray of the chest was negative. The patient was seen by the writer at this time and a tentative diagnosis was made of postoperative partial obstruction probably inflammatory. At operation 13 days after admission the abdomen was opened through a right rectus incision and the peritoneum was found to contain a large quantity of clear straw colored fluid. A large mass was found in the epigastrium which was composed of indurated mesentery. The induration was most pronounced in the region extending from the appendix up to the gastrohepatic omentum involving the latter and the retroperitoneal tissues. This whole area was markedly edematous and the gastrohepatic omentum was more than an inch in thickness. The liver showed no surface indicative of disease but deep palpation disclosed numerous nodulations of various sizes highly suggestive of a pylephlebitis of the liver veins substantiated by the induration of the lower portal system. The edematous condition of the mesentery completely obscured the pancreas. Numerous adhesions of the small intestine were separated and it was noted that the resulting bleeding was excessive probably due to the obstructed portal circulation. The wound was closed without drainage. The postoperative diagnosis was pylephlebitis secondary hepatitis with intestinal adhesions causing partial intestinal obstruction. The postoperative course was uneventful except that the temperature rose occasionally above the normal. The patient was discharged 25 days after the operation. Two weeks after his discharge an abscess ruptured spontaneously through the upper end of the wound which drained bile stained pus for several weeks. He is now in good health and without symptoms.

CASE 13. E. G. F. a female 67 years of age was taken sick 9 days before admission with lower right abdominal pain. Three days later she was seen by her physician who made a diagnosis of acute appendicitis and sent her to the hospital. At operation (Dr F. E. Keepe) a retrocaecal mass was found well walled off secondary to a ruptured retrocaecal appendix. The abscess was drained through a gridiron incision. Five days after operation the temperature was normal and the patient was feeling well. The wound was draining well. On the eighth postoperative day the drainage tube had been removed but the patient began to show an afternoon elevation of temperature to 100.3 degrees F. This continued increasing to 101.2 degrees on the fourteenth day in spite of the fact that the operative wound seemed well drained. An internist who saw the patient 4 days later found complete consolidation of the right lower lobe with tubular breathing but few rales. A diagnosis of atypical lobar pneumonia was made. The patient continued with little change for a week.

An X ray of the chest made on the twenty seventh day after operation showed no lobar pneumonia but a high right diaphragm and a subdiaphragmatic condition was suggested. The following day (4 weeks after operation) the patient was seen by the writer. She was emaciated and pale. Her previous operative wound seemed satisfactory. The right diaphragm was high little movement could be demonstrated. There was a boggy sensation to the lateral abdominal wall over the hepatic region and several small dilated veins were plainly visible. This area was acutely tender on moderate pressure. There was slight jaundice but no nausea. White blood cells numbered 10 100 temperature was 99.6 -97 degrees pulse 110 respiration 46. Urine was negative. A diagnosis of hepatic abscess of the right lobe was made. Five days later under local anesthesia 3 centimeters of the tenth rib was resected and an exploring needle inserted through the diaphragm revealed thick yellow pus. An opening was made along the needle with the cautery into a large pocket and about 14 ounces of pus evacuated. Digital examination showed the abscess extending through a finger sized opening into an abscess cavity in the dome of the liver about the size of a hen's egg. Gauze packing was inserted in the cavity. The pus culture showed bacillus mucosus capsulatus. During the week following the operation the temperature gradually returned to normal and remained there with little variation throughout the stay in the hospital. The abscess cavity ceased to drain on the twenty fifth day after operation. The patient gradually regained strength was allowed out of bed on the twenty seventh day and was discharged with the wounds nearly healed 6 weeks after the abscess drainage. She is now in good health and without symptoms.

CASE 14. M. K. female age 29 was operated on for appendicitis and drainage was instituted. Two weeks after operation the temperature began to mount to 101 degrees but there was no chill and the patient developed symptoms of intestinal obstruction with pain tenderness and a mass to the mesial and upper sides of the wound. A few days later this tenderness had extended to the left of the umbilicus. The abdominal wall over the entire right side presented a doughy feel to examination. Peristalsis was drum head except in the upper left quadrant. Pelvic examination revealed an empty ballooned rectum otherwise normal. There was no liver tenderness and the chest examination was negative. White blood cells numbered 18 000. Urine was negative. The diagnosis made was intestinal obstruction due to abscesses among the coils of the ileum. Operation by the writer revealed several abscesses distributed among the coils of the small intestine one of which was obstructed. The mesentery was indurated and fully 1/2 to 3/4 inch thick on the right side of the abdomen corresponding to the venous channels draining the appendiceal area. Some of the veins appeared to be thrombosed. The liver could not be examined because of adhesions

APPENDICITIS IN INFANCY AND CHILDHOOD

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From Milwaukee Children's Hospital

FROM May 20, 1913, the earliest date from which accurate records are available to December 31, 1924, 8,973 patients were admitted to Milwaukee Children's Hospital. During this period 61 operations for appendicitis were performed. The cases were fairly equally divided among five surgeons who were on the active service at different periods. Five patients died, making the mortality for this series 8.2 per cent.

In the following table the 8,973 patients are grouped according to age, and the number of cases of appendicitis occurring in each yearly group is shown.

It will be noted in Table I that none of the patients with appendicitis was under 2 years of age, 12 were between the ages of 2 and 8, and 49 were between 8 and 13. Other series bear out this apparent rarity of appendicitis in infancy. Abt, in 1917, could find only 80 cases in patients under two reported in the literature. Several reasons are advanced to explain the fact that appendicitis is rare in the first few years of life. It is thought that the liquid diet, the absence of hard fecal concretions, and the frequency of bowel movements have some influence, as has the supine position in which the infant spends most of its time.

TABLE I—PATIENTS ADMITTED TO MILWAUKEE CHILDREN'S HOSPITAL BETWEEN MAY 20, 1913, AND DECEMBER 31, 1924, AND NUMBER OF PATIENTS WITH APPENDICITIS IN VARIOUS AGE GROUPS

Patients with appendicitis	Total admitted	
Under 1 year	0	1354
1-2	0	804
2-3	1	539
3-4	0	630
4-5	3	598
5-6	1	722
6-7	4	780
7-8	3	734
8-9	11	752
9-10	8	606
10-11	9	589
11-12	11	506
12-13	10	359
Total	61	8973

It is usually stated that appendicitis is more common among boys than girls in the proportion of two to one. This relation is well demonstrated by our series as 41.67 per cent of our patients were males and 20.33 per cent were females. The statement is also frequently encountered that the mortality rate is twice as high among girls as boys. Of 5 patients who died 3 were girls and 2 were boys.

Certain characteristics of appendicitis in infancy and childhood are emphasized by all writers. Most important are the obscurity of the symptoms in early life with a gradual transition to the classical adult picture with increasing age, the rapidity of the course, and the tendency to perforation with subsequent peritonitis.

In discussing the obscurity of symptoms Howard Kelly says: "The abdomen of a little child is but a miniature of the adult in the relative approximation of all the organs and in the close contiguity of those in the pelvis and in the upper abdomen. The boundary lines of the abdomen are approximated. With age and the assumption of the adult form the organs are separated by a wider interval, their differentiation being thus facilitated." Muller and Ravdin call attention to the fact that many writers erroneously state that the pain in appendicitis in children varies because of the variations in the position of the organ. The appendix receives its nerve supply during embryonic life from the abdominal sympathetic. The sensation of pain which attends the earliest stage of appendicitis is referred to the cutaneous distribution of the spinal nerves with which the sympathetic center makes its connections. As a rule therefore pain is referred to the region of the umbilicus, the terminal distribution of the tenth and eleventh intercostal nerves. As the inflammation spreads and the peritoneal coats and contiguous structures are involved the pain is felt in the right iliac fossa or wherever the appendix may be located. It is this second

ANTERIOR ABDOMINAL HYSTEROTOMY FOR THE INTERRUPTION OF PREGNANCY AND STERILIZATION ITS INDICATIONS¹

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INTERRUPTING pregnancy by anterior abdominal hysterotomy and at the same time sterilizing the patient is a procedure that has not been practiced in this country even when the condition indicated the advisability of the operation. One must come to this conclusion after a careful search through the literature of the past 40 years. The only reference that I was able to find is a report of a case by Charles Child Jr., in 1910. It is probable that gynecologists and obstetricians have long practiced some such procedure for combined abortion and sterilization per abdomen. However we have not attached sufficient importance to the subject considering the seriousness of the problem and the difficulty it often presents in the matter of judgment. Abroad this type of operation has not been neglected and various methods, modifications and improvements have appeared from time to time. I have had occasion to operate in 18 cases of this nature and have gradually evolved a simple technique the elements of which in all probability have been utilized by others but in a somewhat different manner. The use of this method where there are positive indications for it has proved an excellent way of handling these difficult cases.

At the meeting of the New York Obstetrical Society where Dr. Childs reported his case Dr. Polak mentioned that on three different occasions he had employed a somewhat similar procedure. The method described by Childs consisted in opening the abdomen by a low transverse incision making the posterior fundal uterine incision reach both cornua, emptying the uterus and then resecting the isthmus portion of the tubes and burying the free ends in the folds of the broad ligaments, then dilating the cervix and packing the cavity with iodoform gauze. Such a technique was followed by the Germans for several years until 1913 when Selheim made the transverse uterine incision immediately below the fundus

posteriorly and then resected either part or the entire tube thereby doing away with the danger of infecting the uterine cavity through the cut tubal ends. This method was shortly followed by one which utilized a longitudinal incision on the posterior surface and then resected either a part or the entire tube. Subsequently the longitudinal incision was brought to the anterior surface of the uterus in the cervical region. This necessitated the peeling back of the bladder deflection and involved great risks of infecting the normally sterile uterine cavity with infection of the cervix which almost always is present.

Dorfler in a recent article entitled '*Kleiner Kaiser Schnitt*' advocated peeling back the bladder making a low cervical incision, emptying the uterus, then resuturing the bladder over the incised area in an attempt to eliminate the raw surface. He sterilized by resecting part of the tube.

There still remain to be mentioned several other ways of combining therapeutic abortion and sterilization in one operation. Some gynecologists have tried the vaginal route, first emptying the uterus, then deflecting the bladder, opening the anterior cul de sac, bringing out the uterus, resecting the tubes and finally closing the cul de sac, bringing down the bladder and closing the anterior vaginal wall. Thus they avoid opening the abdomen at the expense of a procedure requiring much more time, a much greater loss of blood and a far more difficult technique.

Other methods that have been employed by various surgeons are the following:

One is to empty the uterus by curettage and to send the patient home to recuperate with the understanding that she is to return for a sterilization operation later. This is almost uniformly a failure for the patient rarely comes back until she is pregnant again. In the meantime, her general health is being undermined by a constant dread of a possible pregnancy. Another is the combined method of

It is a truism to say that in acute appendicitis in infants and children the prognosis depends on proper and early diagnosis and prompt surgical intervention. In spite of the difficulties which have been enumerated careful analyses of symptoms and signs leads to a surprisingly high percentage of correct diagnoses. In the treatment of appendicitis it has been the policy of the surgical section of this hospital to advise operation in all but obviously moribund patients. Even in desperate cases the results of operation have been at times most gratifying. In infants the omentum is a thin short transparent structure, plainly not involved in the localization of infection. It gradually increases in size and length, and in older children is occasionally seen near the appendix and at times is wrapped around it. The peritoneum in infancy and childhood is also less resistant to infection than in the adult. In children vomiting from intra abdominal disease dehydration is rapid and the general bodily reserve which may be utilized to combat infection is soon exhausted. In several instances children apparently in desperate condition have been transformed to hopeful cases in a few hours by operation. The change in the facial expression in some of these patients is especially striking. We believe that the expectant plan of treatment has an extremely limited field of application in appendicitis in infancy and childhood.

The cases here reported represent all cases of appendicitis seen at this hospital during the stated period with only three exceptions which are the following. Two patients both girls aged 9 and 10 had mild attacks and were discharged from the hospital as improved. Operation was advised in both cases but was not done because the parents refused in one instance and because of severe illness in the family of the other. The third patient listed as appendicitis came to the hospital with a two day history of pain in the abdomen vomiting and sore throat. The temperature on admission was 103.4 and there were rigidity and tenderness over the lower right abdomen. Within a few hours after admission a typical scarlet fever rash developed and the patient was sent to the isolation hospital.

TABLE III—MORTALITY RATES IN APPENDICITIS IN CHILDREN QUOTED BY VARIOUS AUTHORS

	Per	Cent
Alexander	3	500
Muller and Ravdin	6.8	58
Beckman	7.8	
Simpson	14.7	31
Mitchell	24	40
Gray and Mitchell	15	100
Spreading peritonitis in acute		

Our mortality rate of 8.2 per cent reflects the improvement in treatment and diagnosis which is evident in more recent series. In 80 cases under 7 years of age collected by Abt in 1917 the mortality was over 50 per cent. Only 46 of these patients were operated on the operative mortality being 30 per cent. The mortality rate among patients not operated on was over 90 per cent. The following mortality rates shown in Table III are representative of those in the recent literature.

It is to be noted that of our patients who died all had ruptured gangrenous appendix with spreading peritonitis. One death occurred on each of three services and two on one other. The earliest day of admission following the onset of symptoms in fatal cases was the third. One entered on the fourth day one on the sixth day one on the tenth day and one on the fourteenth day following the onset. The fact that no deaths occurred among the patients with ruptured appendices operated on prior to the third day is merely an added bit of evidence for early intervention. Our patients who died were all desperately sick and it is fair to assume that operation gave them their only chance for recovery. It is fair to assume also that several of the patients operated on after the first 48 hours and who recovered would have died but for operation. In other words by refusing to operate on these desperately sick cases one may improve his operative mortality statistics but taking all cases of appendicitis entering a hospital as a group fewer patients will be discharged alive and well if this policy is followed than by operating on all cases except those in extremis.

In addition to advocating operation in practically all cases we believe that the McBurney muscle splitting incision is not only the

with the anastomosing circulation between the uterine vessels and the ovary. If the tubes are resected the utero ovarian anastomosing vessels are removed and the ovary may become cystic.

It is of importance to note that in Europe, special curettes and dilators were devised to clean and dilate the uterus from above. However, I have found it absolutely unnecessary to use either curettes dilators, or uterine packings.

Because of the ethical and moral principles involved as well as because of the bad operative risks which the cases present this operation must never be considered except when certain definite indications exist and then only after an internist and a gynecologist have held a consultation. As a gynecologist I can only enumerate the conditions in which the operation is indicated and give you the opinions of several internists as expressed to me. This operation is indicated for those women who are suffering from a chronic debilitating disease with little or no hope of a cure and in cases in which experience has shown that the continuation of the pregnancy would certainly shorten or even terminate the patient's life. Specifically the diseases wherein these conditions are indicated come under four groups (1) pulmonary tuberculosis (2) certain cardiac diseases (3) chronic nephritis and hypertension and (4) unusual cases.

1. *Pulmonary tuberculosis*. Abortion and sterilization should be effected in cases of pulmonary tuberculosis which run a subacute course characterized by fever rapid pulse sweats and loss of weight and especially by one or more previous therapeutic abortions for a similar condition. For example

CHART No. 1738. M. H. age 24 born in the United States was admitted into the Kings County Hospital July 5 1923. She is pregnant and has tuberculosis. Doctor said that she should come to the hospital to have an abortion performed.

There was a history of two therapeutic abortions one in 1921 and the other in 1922 two pulmonary hemorrhages within 1 year and positive sputum. The patient had lost 10 pounds and had had no children.

The diagnosis of a 10 weeks pregnancy was made. Medical consultation. Pregnancy too much for her on this occasion. The condition makes it absolutely necessary that she shall not carry this conception.

Her health depends upon longer freedom from extra burden. Termination demanded.

An abdominal hysterotomy with sterilization was performed on July 9 1923 with gas as the anesthetic. The operation was completed in 25 minutes. On the tenth day the patient was permitted out of bed. She was discharged on July 21 1923 with primary union of abdominal wound no induration no tenderness and the pelvis entirely negative.

This case illustrates the uselessness of abortions without sterilization. The patient already had undergone two operative procedures in both of which anesthesia had been induced and on both occasions she had been emphatically instructed that it would be dangerous to become pregnant again. She was told to return at a later date for sterilization. Without a doubt each pregnancy as well as each abortion aggravated the lung condition. In order to give the lungs a chance to heal and to eliminate the dread as well as the actuality of another pregnancy it was necessary to accomplish abortion accompanied by sterilization.

In this connection it is interesting to note that according to M. A. Couvelaire "38 per cent of children, born of tuberculous mothers removed from their mothers immediately after birth and brought up under the best conditions do not survive their first month."

2. *Cardiac indications for sterilization*. Aortic regurgitation is a positive bar to pregnancy because the strain upon an overburdened left ventricle may be great enough to cause acute dilatation of the left heart with the onset of pulmonary edema. Especially dangerous are the cases of aortic regurgitation complicated with a relative mitral regurgitation or that have at any time become decompensated. Sterilization is indicated if there is a mitral lesion and the cardiac reserve has become exhausted, as evidenced by repeated attacks of decompensation. This is especially true of mitral stenosis. In cardiac arrhythmias auricular fibrillation is the most important indication. Myocardial degenerations due to chronic infections should be relieved of the strain of possible pregnancies.

An example is the case of I. S. 34 years of age, gravida IV, para admitted to the Brownsville and East New York Hospital on March 16 1924.

ACQUIRED SUPPURATIVE DIVERTICULITIS WITH PYLEPHLEBITIS AND METASTATIC SUPPURATION IN THE LIVER

REPORT OF A CASE

By SAMUEL T. KRAMER, M.D. PERTH AMBOY, NEW JERSEY, AND
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ACQUIRED diverticula have only recently received ample attention in the literature. The condition is quite uncommon although not rare, and it is not so long ago that it was considered a mere pathological curiosity. Quite a large number of case reports have appeared in the past 25 years which have established the importance of the condition because of the secondary pathological processes which are apt to occur. As recently as 1917 Telling (3) was able to find only one case of metastatic suppuration secondary to diverticulitis which was recorded by Whyte (4). Whyte's case was one of suppurative diverticulitis with metastatic abscesses in the liver. Clinically and pathologically his case was practically similar to ours, although he was unable to obtain a positive blood culture during life and necropsy failed to reveal gross evidences of pylephlebitis. In 1921 Foggie (2) reported a case of abscess of the brain secondary to diverticulitis, and at that time claimed that his case was the second on record of distant suppuration from this cause. Careful search of the literature since has failed to reveal any other similar case. It appears therefore that our case is the third on record of diverticulitis with metastatic suppuration and the first with pylephlebitis.

INCIDENCE

In 13,069 necropsies performed at the Dresden City Hospital, Johns Hopkins Hospital, Boston City Hospital, and the Bender Hygienic Laboratories there were found 39 cases of congenital (Meckel's) diverticula, 16 instances of acquired diverticula of the small intestine, and 28 cases in the large gut. Diverticula are usually multiple and are found most frequently in the large bowel, especially in the lower part of the descending colon and sigmoid flexure. The sacs occur on the side of the gut or close to the mesenteric attachment,

although they are found on the convexity in rare instances. The size varies from mere macroscopic visibility to that of a hazelnut. They rarely attain a larger size since secondary pathological changes are very apt to supervene.

ETIOLOGY

The question has arisen whether this condition is congenital or acquired. It appears very significant that no case has occurred in a child, the lowest reported age being 22 years. Although the anatomical arrangement of the muscle fibers and connective tissue of the vessel spaces furnishes a predisposing factor, it appears likely that the condition is acquired. The average age is about 60 years, and the occurrence is about twice as frequent in males. Because of the presence of fatty tissue in the bowel wall, obesity may be a factor. The physiological rôle of the sigmoid with its retention of fecal matter and gas is stated to be important as is muscular deficiency of the gut wall associated with constipation and flatulence. It is evident that the spots where the gut is pierced by the vessels are areas of weakened resistance to internal pressure. Vascular dilatation incident to passive congestion of heart failure may further weaken the vessel spaces by pushing aside the muscle fibers. It is probable that no one factor is sufficient, but that several or all co-exist.

PATHOLOGY

There is no trouble until secondary pathological changes occur. The first tendency is toward progressive enlargement of the sac, which leads early to atrophy of the muscle layers and the glands of the mucosa. The irritation of the contained hardened feces results in dangerous thinning of the sac and inflammatory changes which may be slight or may lead to serious, acute or chronic lesions. Acute gangrenous inflammation of diverticula

END-RESULTS IN THE INTERPOSITION OPERATION FOR THE CURE OF PROLAPSUS UTERI AND CYSTOCELE

By FREDERICK W. JOHNSON M.D. F.A.C.S. BOSTON

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THE interposition operation described by the late Thomas J. Watkins of Chicago is the foundation on which I have built but my operation differs from any I have seen described in that the whole anterior surface of the uterus down to the cervix is sewed to the fascia of the anterior vaginal wall. Thus you get the uterus firmly fixed in anteversion to the fascia and the bladder resting on the posterior aspect of the body of the uterus.

In the April 1919 number of SURGERY GYNECOLOGY AND OBSTETRICS my associate at the Carney Hospital Dr. I. E. Phaneuf and I tabulated 90 cases of the interposition operations and the end results in 68 of them.

The first was operated on May 31, 1909 and the last May 5, 1918, an average of about 10 a year. Eighty-nine were operated on at the Carney Hospital. The mortality was nil. The oldest patient in this series was 69, the youngest 21. Forty-six were between 50 and 60 years of age while thirty were between 40 and 50.

Almost all of the cases were from the laboring class and as soon as possible were obliged to return to their homes and household duties—just the class that would put any operation for prolapsus and cystocele to its severest test.

From answers received from 68 patients it appeared that 54 had been wholly relieved of the troubles complained of at the time of operations; there had been no falling down of the parts and there had been improvement in their general health. This certainly is gratifying as I know of no other operation for prolapsus uteri and cystocele attended with almost no danger and no shock that gives as good end results.

It is an operation from which elderly and old women recover quickly.

Since May 5, 1918, when the last case in the above series was operated on up to July 19, 1919, I did this modification of the interposition

operation on 50 patients—about 10 a year or a little over as I was away 15 months out of these 5 years. In this series as in the other the oldest patient was 69. The youngest was 30. Twenty-one were between 50 and 69 years of age, 18 were between 40 and 50 years of age. It was found necessary to repair or amputate the cervix in 41 cases (55 in the former series) and Crossen's or Bandler's operation for relaxed pelvic outlet and rectocele was done in 45 cases (76 in the former series). The mortality was nil.

All in this series of 50 were operated on at the Carney Hospital. Letters were sent to each of the 50 patients excepting those who came to my office for examination and the following questions were asked:

1. Did the operations relieve you of the troubles of which you complained?

2. Is there falling down of the parts?

3. To what extent has your general health been improved by the operations?

I received 32 replies out of the 50.

It appeared that 27 out of the 32 had been wholly relieved of the troubles complained of at the time of operations; there had been no falling down of the parts and there had been improvement in the general health. Two got partial relief. There was total failure in 3 cases. By this I mean the cervix again presented at the vulva. These were cases of enterocele which I did not recognize at the time of operation but had considered very large rectoceles. Twenty-seven complete cures (nearly 90 per cent) out of 32 patients operated on certainly speaks well for this method of dealing with prolapsus uteri and its accompanying cystocele and rectocele.

In the two series there were 140 patients operated on; reports of end results were obtained in 100 cases and 81 patients reported they were wholly relieved.

The opening into the peritoneal cavity anteriorly must be large enough so that the

The past history revealed a chancre 30 years ago for which numerous courses of antiluetic treatment had been given. A cataract was removed from the left eye about 3 years previous to entrance. The patient denied excesses of any kind.

The physical examination revealed an elderly well nourished negro male acutely ill and quite markedly prostrated. The skin had a peculiar yellowish brown color and there was definite icterus of the sclera and buccal mucosa. The pupils were small and equal in size but the left eye had an old iridectomy scar. The heart and lungs were normal. There was no evidence of free fluid in the peritoneal cavity. The liver was enlarged and was palpated three finger breadths below the costal margin. Marked tenderness and considerable voluntary muscle resistance were present over this area. The remainder of the abdomen was soft and free from any of the signs of peritonitis. No other organs or masses were palpated.

The blood pressure was 121-75. The blood count showed 17,000 to 19,000 leucocytes during the stay in the hospital. The urine was negative except for the presence of bile. Examination of the blood showed urea nitrogen 24.28 milligrams per 100 millimeters, uric acid 2.37 milligrams per 100 millimeters, creatinine 7.75 milligrams per 100 millimeters. Blood culture April 23, 1925 showed *streptococcus viridans*. Wasermann reaction was negative.

X-ray of the gall bladder region revealed the liver to be enlarged. No shadows of a positive significance were seen in the right hypochondrium.

When admitted to the hospital the temperature was 101 degrees. Subsequently it remained normal or subnormal except for a terminal rise to 99.4. The pulse varied between 80 and 120. The patient continued to grow worse during the next week and 2 days before death sank into a condition resembling cholera.

Extract of autopsy record. The peritoneal surfaces are smooth and glistening. There is no peritoneal fluid. The appendix and gall bladder are grossly unaltered except for a few adhesions about the former. There is no obstruction in the common or hepatic bile ducts.

The liver is somewhat enlarged and the edges rounded. The surface has mottled areas resembling small subcapsular abscesses. On cut section the portal radicals large and small are filled with thick grey brown pus. There are numerousiliary abscesses in the liver tissue especially about the porta hepatis and the lower margin. The portal vein just before its entrance into the liver is filled with thick pus which is found in all its tributaries from the intestines particularly in the inferior mesenteric vein draining the large bowel.

The lower bowel especially the descending colon and sigmoid shows along the mesenteric border numerous diverticula filled with fecal material. In several areas these diverticula are occluded and suppurating. In connection with these large dissecting abscesses are found in the wall of the large bowel some of which communicate with branches of the mesenteric veins. There are no evidences of dilated or thrombosed hemorrhoidal veins.

Anatomic diagnosis. Multiple fecal impacted diverticula of the colon and sigmoid suppurative diverticulitis with huge intramural abscesses of the colon and sigmoid suppurative phlebitis of the mesenteric splenic and portal veins suppurative hepatitis and cholangitis multiple abscesses of the liver icterus gravis etc.

This case in retrospect presented a typical picture of pyelephlebitis. All the cardinal symptoms were present such as chills pain in the hepatic region change in liver dullness jaundice picture of marked toxemia absence of signs and symptoms of extensive peritonitis leucocytosis, and positive blood culture. However appendicitis or hemorrhoids were never even suggested in the history or findings. It was evident that the patient had a pyemia and there was every suspicion of suppuration within the liver but because of the absence of evidence of an intestinal lesion it was believed that the infection a virulent suppurative cholangitis was probably secondary to cholecystitis.

Pylephlebitis as a complication of neglected appendicitis is not a rare occurrence. It is probable that in the future more cases of multiple abscesses of the liver will be traced to diverticulitis. It also would follow that additional cases of pyelephlebitis secondary to diverticulitis will appear in the literature since it is a very logical sequence of neglected typhlitis.

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the vena cava to form an Eck fistula. They showed further that bilirubin, which cannot be demonstrated in dog serum by the usual tests, was formed in animals with a cephalic and thoracic circulation only, the liver having been entirely excluded. Mann and his associates (19) at the Mayo Clinic have furnished positive proof by removing the liver from dogs using a three stage operative technique which permits the survival of the animal for a period of from 24 to 36 hours. During this time a definite icterus develops bilirubin appearing in the blood stream in considerable amounts. More recently they have obtained similar results in animals after complete extirpation of the liver by a single operation their findings have been confirmed by Rich and Makino.

The source of bilirubin is now generally conceded to be hæmoglobin set free during the normal destruction of blood within the body hæmatin being transformed into bilirubin by the loss of the iron containing portion of the molecule. The remaining fraction formerly spoken of as hæmatoidin is chemically identical with bilirubin as has been shown by Rich and Bumstead. The actual transformation of hæmoglobin to bilirubin has not as yet been satisfactorily accomplished *in vitro* but it has been repeatedly observed in the living animal. The local formation of bilirubin in hemorrhagic effusions as originally demonstrated by Virchow is a well established fact. It is also known that the intravascular injection of laked blood or solutions of hæmoglobin causes a sharp increase in the bilirubin output of animals with biliary fistulas. In Mann's liverless dogs increased bilirubinæmia follows this procedure. Recently Rous and Drury have suggested that the level of serum bilirubin in dogs with obstructive jaundice bears a direct relationship to the rate of destruction of red blood cells.

It has been suggested by Aschoff and others that this transformation of hæmoglobin to bile pigment is accomplished by means of the reticulo endothelial system. These cells are widely distributed throughout the body the endothelial cells of the spleen, bone marrow, and lymph glands, and the Kupffer cells of the liver belonging to this group. They act as

phagocytes and are known to take up broken down red cells the hæmoglobin within the corpuscles being digested and the iron containing portion hæmosiderin being deposited in the endothelial cells themselves. It is believed that the iron free portion, either bilirubin or some substance of similar chemical composition, is returned to the blood stream. This hypothesis at once explains the results of Minkowski and Naunyn, since the livers of geese contain the greater part of their reticulo endothelial structures. In liverless birds the dissolution of hæmoglobin and the subsequent formation of bilirubin were therefore greatly impaired.

Rich (24) in his recent review of the subject of extrahepatic formation of bilirubin considers it proved that hæmoglobin is the sole source of bile pigment. He believes that there is no evidence that the polygonal cells of the liver or the cells of any other tissue except possibly those of the reticulo endothelial system ever form bile pigment, the evidence that the latter cells manufacture bilirubin is not sufficiently complete to be regarded as proof although the great probability of such a process is conceded.

The normal pathway of excretion of bilirubin is by way of the polygonal hepatic cells in certain types of jaundice it may be excreted by way of the kidney. In general it may be said to behave as a threshold substance with regard to both organs.

On the basis of this theory of bilirubin metabolism McNee (15) has evolved a theory of jaundice which correlates very well the clinical facts and experimental data now available. By a schematic representation of the liver lobule he has demonstrated the possibilities of pathological interference with formation and excretion of normal bile pigment. He regards the polygonal hepatic cells as forming a tubule with a blind end and the free end passing into a bile capillary. Surrounding each tubule he hepatic vascular capillaries lined with Kupffer cells of the reticulo endothelial system and carrying blood from the portal to the hepatic vein. Jaundice may be produced in one of three ways. If the bile passages are occluded bilirubin which has passed through the vascular channels and

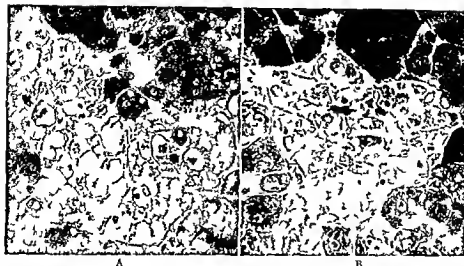


Fig. 2. Photomicrographs of excised pancreas (dog) showing: A, hydropic degeneration of the beta cells; B, restoration of cells of islets of Langerhans. (From Copp and Barclay.)

potentially diabetic. As long as these dogs were kept on a regulated diet there was sugar in the urine and the blood sugar level remained normal. But when these potentially diabetic dogs were overfed the blood sugar increased and the dogs began to excrete large quantities of sugar in the urine and to show the signs of general physical failure such as are exhibited by uncontrolled diabetic patients. After the animals had been subjected to this overfeeding for from 7 to 9 weeks the authors excised a piece of the pancreas in which they were able to demonstrate the hydropic degeneration of the beta cells (Fig. 2 A).

The dogs were then placed on proper diet and insulin was administered. The urine promptly became sugar free and the blood sugar normal. After they had been subjected to this controlled regimen for from 7 to 9 weeks again a portion of the pancreas was excised and examined and the cells of the islets of Langerhans were found to be restored (Fig. 2 B).

These findings provide a concrete demonstration of what we have repeatedly seen clinically, that is, that when diabetes is treated early in its development there is a good chance of restoration of the insulogenic function, but if the treatment is postponed until

the islets are gone—fibrosed—nothing will bring about their regeneration.

It is for this reason that when glycosuria occurs during pregnancy it should never be ignored as a chance occurrence as due perhaps to sugar of milk, but the patient should be subjected to a rigid examination to determine the exact status.

As a rule the diagnosis is quickly and easily made except in borderline cases by making a blood sugar estimation 2½ hours after a heavy meal of carbohydrates. If this blood sugar value is 160 milligrams per 100 cubic centimeters of blood or more we can safely say that we are dealing with a diabetic patient in whom however the condition may clear up after parturition provided the condition is properly controlled in the meantime. On the other hand if the blood sugar estimation in the above test is 90 milligrams per 100 cubic centimeters of blood or less then we may know definitely that we are dealing with the renal type of glycosuria which requires no treatment.

CASE 2. This patient was a young married woman 24 years of age who was in the third month of her first pregnancy. There was no familial history of diabetes. During childhood she had had measles, mumps, chickenpox, diphtheria, and whooping cough, and later in life tonsillitis, grippe, and pleurisy. Ten years before a tonsillectomy had

action is well known some evidence exists to show that they are reabsorbed from the intestine and act in this way as a stimulus to the further production of bile

The effect of the retention of bile acids on the organism is very imperfectly understood. Cholic acid is known to be toxic it acts on heart muscle similarly to digitalis and may also cause degeneration of the renal tubules. Macht and Hyndman have suggested that the toxicity of bile may depend on the cholic fraction of the bile acids. French clinicians have attributed the bradycardia and pruritus observed in cases of jaundice to these acids.

The whole subject of the metabolism of bile acids and their precise effect on the organism in cases of jaundice remains uncertain pending the perfection of a method for their quantitative determination on the blood. Aldrich, Rowntree and Greene of the Mayo Clinic and McNee (14) have independently evolved such methods and are at present engaged in further studies.

The conception of dissociated jaundice that is a selective retention of either bile acids or bile pigments is to be attributed to men of the French school notably Brul-Chauffard and Vidal. Their conclusions were based on the study of the products of the metabolism of bile in the stools and urine and consequently are not entirely conclusive. Hoover and Blankenhorn reviewed much of this work in 1916 they attempted a study of these substances in the blood stream and described retention of bile acids in cases of primary anaemia and lead poisoning without any retention of bile pigments. A further review of this whole subject newer methods being used would be of great clinical interest.

The clinical importance of these new conceptions of jaundice has only recently been properly appreciated. Recent knowledge of the mechanism by which jaundice is produced together with van den Bergh's method of studying the bilirubin content of the blood has been of much value in clarifying a number of obscure points with regard to hepatic disease. The recognition of latent jaundice obviously a most important point has also been made possible by this method. Previously the only reliable aids were the scleral color and

the presence of bile in the urine. A serum bilirubin content of from 3 to 5 milligrams is necessary before the urine gives the usual tests for bile in cases of obstructive jaundice. In cases of hæmolytic jaundice considerably larger amounts may be present without any passing through the kidney. A threefold to fivefold increase in the serum bilirubin is necessary for the production of clinically demonstrable icterus. A number of recent observations tend to establish the belief that the affinity of body cells generally for bilirubin is not great the quantity of the pigment present in jaundiced tissues remaining relatively low and constant in spite of wide fluctuations in the quantity in the serum. These facts demonstrate the obvious advantage of the direct study of the blood in cases of jaundice.

Van den Bergh's test therefore will furnish earlier and more accurate information regarding the onset of jaundice than any other means at the physician's command. The clinical value of the test has been emphasized by van den Bergh, de Takáts and others. In my experience it has aided in the recognition of hepatic congestion in cases of early myocardial failure in the differential diagnosis of anaemia due to destruction of blood in the identification in some instances of a typical gall stone colic and in the early demonstration of jaundice following obstruction of the common duct. Carotinæmia may also be distinguished from jaundice by this means. The test is also useful to the surgeon as a quantitative measure of jaundice aiding materially in the selection of a time for operating on patients whose jaundice may be increasing or subsiding. Its value in this capacity has been particularly emphasized by Judd who also considers it a most valuable aid to prognosis. Finally, fluctuations in the content of bilirubin in the serum may be significant in distinguishing jaundice due to stone in the common duct with partial obstruction from the progressively increasing type seen in pancreatic carcinoma and stricture of the common duct.

The pathological changes in the liver associated with jaundice have been widely discussed. The reaction of the liver to toxic or bacterial injury is a proliferation of connective tissue, with subsequent cirrhosis. The degree

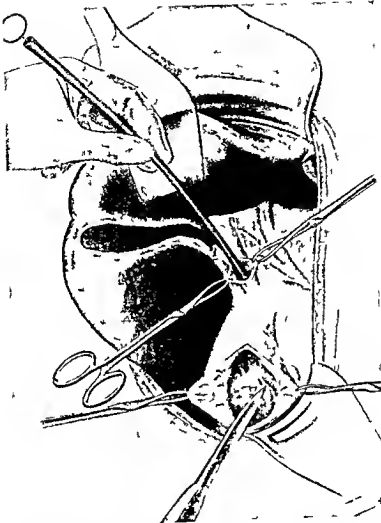


Fig 5 If there is a calculus in the ampulla of Vater obstruction of the papilla the duodenum is opened. The papilla may be incised for the extraction of the calculus or the passage of the drain.

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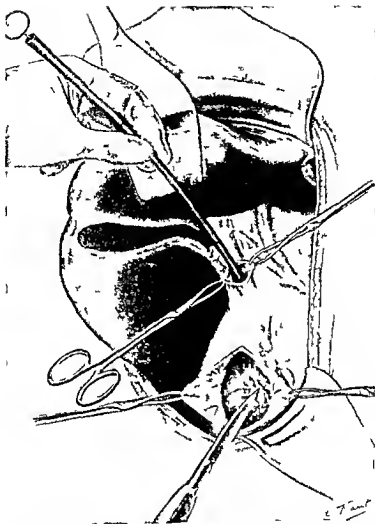


Fig 5 If there is a calculus in the ampulla of Vater obstruction of the papilla the duodenum is opened. The papilla may be incised for the extraction of the calculus or the passage of the drain.

hepatic functions relating to carbohydrate and protein metabolism were somewhat, but not seriously altered. Diminished formation of urea as shown by sharp decreases in the blood urea and non protein nitrogen occurs almost at once after operation. Uric acid, however did not accumulate in the blood as it does in dogs after hepatectomy. An impairment of carbohydrate metabolism as evidenced by decreased fructose tolerance developed from 6 to 11 days after the onset of jaundice. The fasting level of the blood sugar usually remained within normal limits although moderate hypoglycemia, which did not respond to the administration of fructose, was noted in two animals before death.

In the clinical series similar but somewhat less definite results were noted. In about half of the cases studied the fructose tolerance was lowered. Blood urea values showed on the average a slight decrease, but did not in any case fall below the lower limits of normal. In brief, the failures of carbohydrate and protein metabolism, which characterize Mann's debilitated dogs were not approached in either the clinical or experimental series. This perhaps is to be expected in an organ with so large a factor of safety as the liver.

From the standpoint of treatment however the impairment of carbohydrate metabolism is of considerable importance. It has long been known that a high carbohydrate diet protects the liver very effectually against experimental toxic injury. Mann (18) has found that feeding glucose has greatly increased the period of survival of animals after the induction of obstructive jaundice. These two points have been utilized clinically in the post operative management of patients with long standing obstructive jaundice presenting the syndrome of hepatic insufficiency described by Walters and Parham. In a number of such cases observed at the clinic the intravenous administration of glucose has been a most effective method of treatment, producing remarkable and permanent improvement in several practically moribund patients.

The excretory functions of the liver as measured by the use of dyes, show much more definite impairment in cases of obstructive jaundice than those related to carbohydrate

and protein metabolism. The results of the Rowntree-Kosenthal phenoltetrachlorophthalein test in both the experimental and clinical series already mentioned were very striking. In animals, maximal retention of dye was observed 24 hours after cholecystectomy and ligation of the common duct. In animals whose gall bladder had been left intact jaundice and retention of dye developed somewhat more slowly. In both groups of animals however the level of serum bilirubin on successive tests was almost exactly parallel to the degree of retention of the dye suggesting a possible relation in the manner of excretion of the two substances. In patients with obstructive jaundice the same striking parallelism of bilirubinemia and retention of dye was observed. The uniformity of this finding did not appear to be influenced by the duration of the jaundice or the etiological agent involved. Rosenthal using phenoltetrachlorophthalein, and Delprat, Epstein and Kerr using rose bengal have demonstrated dye retention in patients with obstructive jaundice; their results are similar to those obtained at the clinic (10, 11, 30).

These observations naturally raise the question of the accuracy of conclusions based on the dye tests for liver function when applied to gross pathological changes in the presence of icterus. It is certain that the hepatic parenchyma is greatly damaged by long continued obstructive jaundice and retention of dye is therefore to be expected. In fact this retention persists in such cases long after obstruction of the common duct is relieved. In obstructive jaundice of short duration however no very definite morphological changes can be demonstrated although dye tests may indicate maximal retention.

Rous and Drury have recently shown in experiments on animals that the liver is unable to take up the dye sodium indigotate after prolonged chloroform anesthesia and that during this period of temporary dysfunction bilirubin is not secreted by the liver. They have further demonstrated that the dye is not absorbed by the liver within so short a time as 24 hours after ligation of the common duct. The interpretation of such findings is difficult, the possibility of functional impairment of the

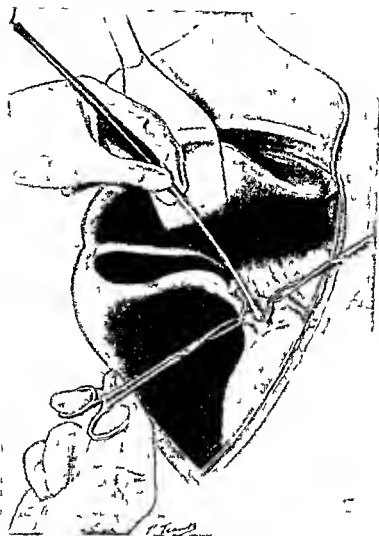


Fig. 2. Cholecystectomy. Illustration of the cystic duct supraduodenal cholecystotomy. The drainage tube is introduced into the common duct.

duodenal passage. A duodenal stenosis below the papilla of Vater certainly contra-indicates internal drainage.

TECHNIQUE

The technique used by Professor Pierre Duval was recently described in detail.¹

Incision. Professor Duval does not use the Kehr or Sprengel incision. He prefers to enter

the abdominal cavity through a vertical incision which is made at the external third of the rectus muscle and bends slightly at the upper angle toward the midline (Mayo-Robson).

After cholecystectomy and ligation of the cystic duct, a vertical supraduodenal incision is made in the common duct. The duct is probed through this incision with urethral sounds. The papilla is gradually dilated up to the size of a No. 8 bougie. The catheterization is usually very easy. It can be readily noted the moment

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insufficiency in obstructive jaundice *Surg. Gynec.*
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- 35 WHIFFLE G H and HOOPER C W Icterus a rapid
change of hemoglobin to bile pigment in the circu-
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612-635
- 36 WIDAL ABRAMI and BRULÉ Quoted by Brulé p 247



Fig. 4 The upper end of the drain is passed upward into the common hepatic duct. Suture of the common duct.

closed in two layers. This interference is stood perfectly by the patient. In four such cases of Professor Pierre Duval's uneventful recoveries were observed.

POSTOPERATIVE COURSE

The postoperative course is generally undisturbed. A slight escape of bile may be noted through the external tube for the first few days.

This tube is ordinarily removed on the fifth or sixth day.

It is advisable to inject liver extracts daily and to administer per rectum 1500 cubic centimeters of saline with sugar. The duodenal tube is tolerated astonishingly well. Because of the metal tip evacuation of the tube throughout the intestinal canal can be observed under X-ray. The earliest discharge has been observed on the forty-fourth day. In some cases a much longer time was required. No accident has been noted during the progress of elimination.

When patient is discharged from the hospital the loss of weight has varied from 2.2 kilograms to 5.4 kilograms. Convalescence is remarkably uneventful.

The notable features of this procedure are the formation of a perfect scar, the absence of hernia formation and of fistula, and the excellent condition of the patient.

SUMMARY

Since April 26, 1924, to January 15, 1926, 47 choledochotomies have been performed in this clinic. Out of these, 16 duodenal drainage was used while in 25 external drainage was used. In the 16 cases of duodenal drainage, 1 death occurred. This was due to lobar pneumonia during an epidemic of influenza. The remaining 15 cases made complete recoveries.

The two main advantages of this method are rapidity of recovery and good end results. Professor Pierre Duval considers this procedure the method of choice in cases of biliary retention which are not or only slightly infected and are in the stage of quiescence.

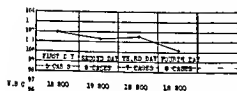


Chart showing average admission temperatures and blood counts of 6 patients with ruptured appendices. The number of days following onset of symptoms and the number of patients entering on that day are shown.

any pain which tells us the location of the appendix.

It is common of many diseases in early life upper respiratory and intestinal infections for example to be ushered in by nausea vomiting fever and abdominal pain. Vomiting occurred in 44 of our cases and was present in all but 3 of the 36 patients with ruptured appendices. Constipation is a symptom of value in the diagnosis of appendicitis and when it is present in association with the foregoing symptoms appendicitis should be considered a probability. McManus gives the rule that in patients over 4 with constipation other things being equal the condition is probably appendicitis while in patients under 4 with diarrhoea the condition is probably gastroenteritis. Twenty four of our cases gave a history of constipation and only 6 a history of diarrhoea. Pain on urination was noted in 10 cases.

The average admission temperature of patients with acute appendicitis unruptured was 100.8 the average temperature of patients with ruptured appendices and a spreading peritonitis was 101. The maximum and minimum temperatures for acute appendicitis were 104 and 98.8 and for ruptured appendicitis were 104 and 98.

The average leucocyte count for the entire series was 17,500 the average count in acute appendicitis unruptured was 15,500 the maximum and minimum counts being 25,100 and 9,800. The average leucocyte count in the acute cases ruptured was 19,000 the maximum and minimum being 39,600 and 11,200. It would seem from these figures that the leucocyte count is somewhat more reliable in indicating the degree of involvement than is the temperature and one is reminded of the statement of Zachery Cope that a normal

temperature does not mean a normal peritonium (Chart).

Fixation of the abdomen during respiration is a striking sign when there is a spreading peritonitis present. Tenderness is difficult to interpret in many instances and it requires tact and patience to elicit this symptom in such a manner as to be satisfactory. Rigidity of the abdominal muscles was noted in 45 of our cases and was not absent in any case in which the appendix was ruptured. Because of the shallow pelvis of the child rectal examination reveals evidence of value much oftener than it does in the adult.

The fulminating character of appendicitis in children is evidenced by the fact that in 36 of the 61 cases 59 per cent the appendices were ruptured. The patients with ruptured appendices entered the hospital on the following days after the onset of symptoms:

TABLE 11—NUMBER OF DAYS AFTER ONSET OF SYMPTOMS CASES OF RUPTURED APPENDICES ENTERED

Day	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth	Tenth	Eleventh	Twelfth	Thirteenth	Fourteenth
1	5	6	8—one died	7—one died	1	2—one died	0	1—abscess	0	0	1—died	0	0	0
2	3—one died general peritonitis	1—two had localized abscesses	2—abscess formation in both											
3	36													
4	30 per cent ruptured in the first 48 hours													
5	58 per cent of the entire series ruptured in the first 48 hours (61 cases)													

Eighteen per cent of the entire series had ruptured appendices in the first 48 hours and considering the cases with ruptured appendices as a group in 30 per cent rupture occurred in the first 48 hours. The average entrance day for the cases of acute appendicitis with unruptured appendices was the second day while the cases of appendicitis with ruptured appendices entered the hospital on an average $3\frac{1}{2}$ days following the onset of symptoms.

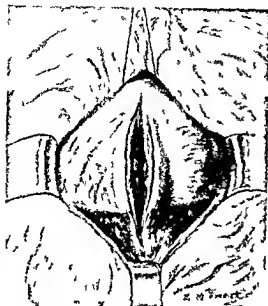


Fig 3 Bladder retracted downward Incision through uterine wall

gestion of fluids. During this preliminary test the character of the contractions, the contour of the uterus, the pulse, temperature and progress in descent and amount of dilatation are carefully checked. Should there be no evidence of advance as is shown by the arrest of the presenting part or no apparent gain in the amount of dilatation of the cervix a careful vaginal examination with the bladder empty should be done and an attempt made to crowd the perfectly flexed head into the brim if there is much overriding or if the consistency of the head and sutures show that it cannot be crowded in the case should be subjected to section.

PRE OPERATIVE PREPARATION

The patient to be sectioned should have a short period at least of pre operative physical and mental rest. This may be secured by giving her $\frac{1}{6}$ grain of morphine and $\frac{1}{200}$ of a grain of scopolamine three quarters of an hour to an hour before the time set for operation and if she has been subjected to a test of labor as above described, he should also have an intravenous injection of 250 cubic centimeters of a 10 per cent glucose solution prior to anesthesia. Morphine and glucose preserve tissue waste.

After the vulva has been clipped of its hair and the vulva and inner surfaces of the thighs have been thoroughly scrubbed with soap and

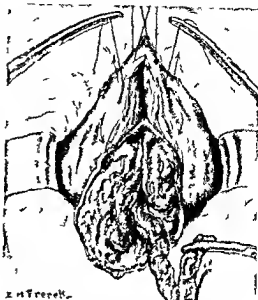


Fig 4 First row of stitches through uterine muscle rolling edges together and helping to express placenta

water 1 ounce of a 4 per cent solution of mercurochrome should be slowly injected into the vagina while the patient has her hips elevated on a sterile douche pan. This should be done at least 30 minutes before she is sectioned and is particularly necessary when the membranes are ruptured. The vulva and inner surfaces of the thighs should also be painted with this solution. The woman is then catheterized and the abdomen prepared in the usual manner with a 3 1/2 per cent iodine solution which is applied over the entire skin surface of the abdomen from the ensiform to the pubis and is allowed to dry. Local anesthesia supplemented with gas-oxygen gives sufficient relaxation.

OPERATION

The patient is now draped with sterile towel and a median incision below the umbilicus is made through the skin and fat exposing the anterior sheath of the rectus muscle. Another knife is now employed to incise the fascia as near the median line as possible. The fascia is opened to the full length of the wound which allows the rectus muscle to be displaced outward and the posterior sheath of fascia with the attached peritoneum grasped between two Kelly clamps and divided. This incision in the posterior fascia and peritoneum is also extended to the full limit of the wound. This exposes the lower segment of

incision of choice but that it is a great factor in reducing intra abdominal manipulation and postoperative shock. Time is an important element in the operation and should be conserved by any means consistent with safety. This incision gives bloodless access to the peritoneal cavity in 1 to 2 minutes, and in closing the wound in serious cases a stitch or two suffices. The degree of operative shock is directly proportional to the amount of small intestine exposed and to the amount of trauma inflicted. It is not unusual when doing appendectomy through this incision to see only a small portion of the terminal ileum. In cases with ruptured appendices with spreading peritonitis the system of drainage which we employ consists of placing a large sized split rubber tube with gauze to the bottom of the pelvis and a cigarette drain to the right kidney fossa both through the original incision.

The importance of the subcutaneous administration of normal salt solution in the postoperative management of these cases cannot be overemphasized. The dehydration resulting from vomiting and abstinence from food and water causes young children to wilt rapidly. As a rule it is not practicable to administer continuous hypodermoclysis but several hundred cubic centimeters can be given repeatedly. We have found codeine to be an efficient and safe sedative and believe that it should be used in doses sufficient to relieve pain, especially during the first 48 hours after operation. One of the most important and most serious postoperative complications is acute intestinal obstruction. When this occurs prompt intervention is imperative but one should guard against extensive operative procedures. The suture of a catheter into a

loop of distended bowel is frequently all that these patients will stand, and fortunately this operation not only relieves the symptoms of obstruction but it is often unnecessary to do anything more.

SUMMARY

1. Appendicitis is rare in the first 2 years of life.
2. There is a tendency to early perforation in appendicitis occurring in children.
3. With few exceptions appendicitis in early life should be treated surgically at whatever stage the patient is seen.
4. The McBurney incision is the incision of choice because it gives rapid and bloodless access to the appendix and as a rule very little intra abdominal manipulation is required when this incision is used.
5. Dehydration is an important factor and should always be considered in the pre operative and postoperative management of these children. It is best combated by the subcutaneous administration of fluids.

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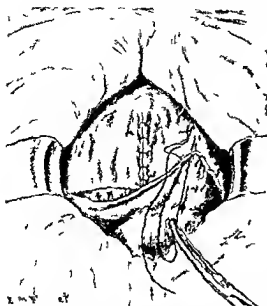


FIG 7 Bladder peritoneum sutured over uterine wound. Downward pull of anterior face of uterus by traction on sutures.

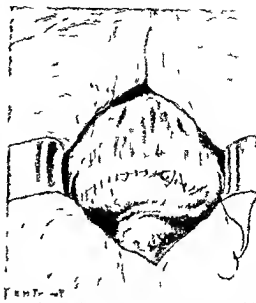


FIG 8 Uterine wound completely covered and in apposition with bladder. The return suture has been nearly completed.

through the muscularis and serosa and through the muscularis alone between each of the deeper sutures. In the upper third of the wound this causes a slight infolding of the edges of the serosa (Fig 6). When the uterine wound is closed and the ends of the sutures cut short the wound is covered with the bladder reflection. This is done with a continuous suture which is begun at one round ligament and is finished at the opposite round ligament; the peritoneal flap being turned across the front of the uterus covering the uterine wound (Fig 7).

It has been our custom to add to the safety of this exclusion by making a second line of sutures which infolds the first and effectually seals the uterine wound from the possibility of peritoneal leakage. It is immaterial when there is sufficient bladder flap whether we make the upper peritoneal flap as suggested by Beck or not.

In potentially infected cases in which the membranes have been ruptured for a long time and the cervix is fully dilated the placenta after it has separated may be expressed through the cervix into the vagina as in the normal case by simply making traction on the untied sutures which have been placed in the uterine wound thus closing it at the same time that the Cr  de maneuver is used. The uterus is then packed through the uterine wound as already described

and the sutures tied and cut. The subsequent exclusion of the wound is carried on as in the relatively clean case.

Remember that we do not claim that the transperitoneal section can replace the Porro operation in infected cases; rather that it has advantages over the classical operation and should be more generally used. If this operation is properly done the finished result is shown in Figure 8. The uterine wound is completely excluded, no intestines have been seen and no areas soiled from the uterine spill.

The abdominal wound is then closed in the usual manner: peritoneum to peritoneum, fascia to fascia, muscle to muscle, while the anterior fascia is closed with a chain stitch of chromic catgut. The skin is closed with clips or a running silk suture. The wound dressing consists of a layer of perforated oil silk and two thicknesses of 4 by 8 gauze.

AFTER TREATMENT

The after treatment of these patients should be as follows. After the woman has rested she is placed in a moderate Fowler position with a Harns drip. She is given a course of ergot and pituitrin: one ampule of pituitrin immediately upon closing the uterine wound and 15 minims of ergotol every hour for 6 hours after her return

has of course been described, as has acute peritonitis of a general or localized nature. When perforation occurs the results depend on the acuteness of the ulcerative process, the amount of chronic inflammatory thickening and the presence of adhesions. Chronic proliferative inflammation of the submucous and serous coats of the bowel may lead to tumor formation and stenosis with obstruction. Thus chronic sigmoiditis resembles carcinoma clinically and pathologically and has undoubtedly been mistaken for malignancy by surgeons at operation and by pathologists at necropsy. The protective adhesions which may be formed in the course of slow inflammation may involve the small bowel giving rise to acute or chronic intestinal obstruction. On the other hand they may become attached to the bladder with the formation of a vesicocolic fistula. Chronic sigmoid mesenteritis with much inflammatory thickening may give rise to twists, kinks or volvulus. Lodgment of foreign bodies within the diverticula, carcinoma secondary to diverticulitis, perforation into a hernial sac and metastatic suppuration have also been reported.

SYMPTOMS

The clinical manifestations based on the foregoing pathological survey must necessarily be very varied. Many cases are identical with an acute appendicitis except that the trouble is on the left side. Left sided tumor and abscess formation are striking features. Some cases are found to have intestinal obstruction in any of the various forms. These are often confused with carcinoma even after the abdomen is opened when of course the recognition of the true pathology is of great importance. Perforative peritonitis or vesicocolic fistula may be the clinical findings with no suspicion of diverticulitis as the underlying cause. Our case is an example of metastatic suppuration in which no thought of diverticulitis was entertained.

DIAGNOSIS

The diagnosis is very difficult and is rarely made. Since the appreciation of the incidence and possible occurrence of a lesion is necessary for its diagnosis, diverticulitis must be borne

in mind by every surgeon who attempts to diagnose and treat abdominal lesions. If the surgeon recognizes the varied pathological pictures and remembers that the condition may resemble clinically almost any acute or chronic condition in the abdomen, many lives will be saved.

TREATMENT

The treatment is of course surgical and the procedure will depend entirely upon the pathological form which is encountered. If an abscess is found it must be drained and the opening in the bowel closed. If the bladder is involved in a vesicocolic fistula the organs must be separated and closed by the usual methods. An intestinal obstruction caused by stenosis of the bowel may be relieved by inguinal colostomy when more extensive procedures are contra indicated by the patient's condition. Resection of the sclerosed and stenosed gut may be performed on patients in good condition. In 1915 Beer (1) attempted to treat a case of pylephlebitis by ligation of the portal vein after an attempt to insure adequate collateral circulation by omentopexy and anastomosis between the left spermatic vein and branches of the inferior mesenteric vein. Some such heroic measure would have been necessary in the surgical treatment of our case.

C. H., a colored male age 68 years was admitted to the Cook County Hospital April 22, 1925 on the medical service of Dr. J. G. Carr. The patient stated that he was in good health and free from any complaint until 12 days before admission when he was suddenly seized with a severe chill lasting about 20 minutes. This was followed by the onset of nausea and vomiting which occurred 7 or 8 times that day. Pain in the upper right quadrant of a dull aching sickening quality intermittent in character and with no tendency to radiation was noted at the onset. In the days following there were frequent chills associated with fever. The pain continued but was never very severe. Vomiting and nausea did not recur after the first day. Jaundice was not noted by the patient although the color of the urine was dark. The color of the stools was not noticed since constipation was marked during the entire period. Weakness and prostration became more marked as time passed. The patient denied any previous attacks of a similar nature.

The inventory of systems failed to reveal symptoms of a nervous, respiratory or cardiovascular character. Nocturia and occasional dysuria had been noted for the past year.

A RATIONAL MANAGEMENT OF SKIN GRAFTS¹

BY FERRIS SMITH A B MD FACS GRAND RAPIDS MICHIGAN
F mth G 1K pd Cl K

IT IS interesting to note that one of the oldest useful procedures known to surgery could pass through 60 years of frequent application without any accurate or rational basis for its total technique. One has reason to believe that the art of skin grafting is among the earliest of surgical accomplishments as it was used by the Kooman priests for rhinoplasty two thousand years ago. Between that time and the work of Riverdin in 1869, little if any, and certainly no scientific attention was paid to the subject. It remained for Riverdin to re-demonstrate the parasitic quality of skin and to point out its value to surgery. He enunciated certain rules for procedure both in the procuring and the application of the skin but he did not stimulate any interest in why it grew nor how it grew nor did he take the next step to determine why larger pieces of skin did not grow in a similar manner.

Stimulation in this work resulted in very valuable contributions by Ollier of Lyons and J R Wolfe of Glasgow in 1872. To Thiersch of Leipzig belongs the credit of perfecting and popularizing the work of Ollier and to Fedor Krause the credit for important modifications of the method of Wolfe. Meanwhile there have been innumerable experiments some fantastic and many of them sound with skin from various sources used under various conditions. The majority of workers agree upon the certainty and widespread application of the Thiersch method but the number of opinions as to the essentials of success with the full thickness graft of Wolfe is limited only by the number of operators. It is this lack of any scientific basis for procedure that has produced such varying reports of success and convinced some operators that only small grafts of this type should be attempted. Successful Wolfe grafting is essential to the facial surgeon and extremely important in plastic procedures on other parts of the body.

Only two types of auto and iso grafts the full thickness graft of Wolfe Krause and the split skin of Ollier Thiersch merit our attention the third type the zoograft being too spectacular and too unnecessary to deserve serious consideration.

There is a wide difference of opinion as to the source of the grafts. It is universally conceded that the autograft is the type of choice but it is

held by some authors that none other will succeed. McWilliams states in a recent article that he has never had any success with isografts and believes that the reports of success with this type of grafts may be relegated to mythology. On the contrary Davis reports 40 cases with 19 successes 16 partial successes and only 5 failures. In our experience we have a number of patients who possess isografts varying in age from 1 to 9 years. The most striking of these is a child who suffered a congenital absence of the lower lid. The lining of her plastic lid was made from a hinged infra orbital flap and the covering from a full thickness graft taken from the inner surface of the thigh of a nurse who possessed the same blood type. This graft is exceptionally good after a period of 2 years. Shawan concluded from observation and experiment that skin grafting obeys the principle of blood grouping as in the transfusion of blood. It is not only reasonable but highly probable that isografts taken from donors with compatible blood types frequently grow as well as autografts and equally certain that such grafts from donors with incompatible blood may grow but will not persist.

The best sources of skin are the upper arm in the male and the thigh in the female the inner aspect of either being chosen when soft hairless skin is required. There is no especial advantage in choosing skin from an area of tension such as the deltoid nor in taking skin from the prepuce, scrotum etc. The only exception is the choice of skin from the ear or another eyelid for grafting about the eye. Nor is there any virtue in producing artificial hyperemia before cutting the skin or obtaining split skin for Thiersch grafting from a bloodless area. It is within the observation of all of us that epithelial scrapings dust and dried particles of skin will grow but that the ease and certainty of growth will not compare with tissue obtained in the usual manner. This brings us to a consideration of the essentials of growth in grafts. All of the conditions are essential to the full thickness variety while one or two only are vital to the split graft.

It is obvious that a graft is parasitic and must exist upon the absorption of tissue juices or lymph during its first 2 or 3 days of existence. Hence its intercellular spaces must be open to the circulation of lymph in order that nourish

GLYCOSURIA AND PREGNANCY

By HENRY J. JOHN, M.D., CLEVELAND, OHIO
Cleveland, Ohio

GLYCOSURIA is frequently found during pregnancy. It means sometimes that the patient is a diabetic but usually it signifies only a temporary or an insignificant condition. In the first instance treatment is indicated in the second no treatment is required. The condition should never be disregarded however until it has been definitely determined whether or not it is of diabetic or of innocent origin.

Two cases taken from a larger series will be sufficient to illustrate the problem presented by the presence of glycosuria in pregnancy and the necessary steps for differentiating innocent from diabetic glycosuria.

CASE 1: The patient was a young married woman 4 years of age who consulted me because of the presence of sugar in the urine. There was no familial history of diabetes. During childhood the patient had had measles, diphtheria and scarlet fever. She had been married 6 years and had two children, the youngest being 5 months old. During her last pregnancy her obstetrician had found sugar in the urine about a month before parturition but the patient was told that it might be milk sugar and no further attention was paid to the circumstance.

During the 6 months since parturition the patient had had no special symptoms until a week before she consulted me when she began to have excessive thirst and frequency of urination. She consulted her family physician who found a marked glycosuria and prescribed a diet which she had followed for the 3 days before I saw her. At this time her fasting blood sugar was 107 milligrams per 100 cubic centimeters of blood. There was a slight trace of acetone and the sugar content of the urine was 1 plus. Although her blood sugar was normal when I first saw her in view of the fact that the patient had had glycosuria just before parturition and had so recently shown definite clinical signs of diabetes I advised a glucose tolerance estimation which was performed on the following day. The characteristic blood sugar curve of diabetes as obtained as is shown on the chart (Fig. 1, Case 1). It will be noted that the fasting blood sugar on this date was 167 milligrams per 100 cubic centimeters of blood whereas the day before it was only 107 milligrams per 100 cubic centimeters of blood. The morning urine on the day of the glucose tolerance test showed only a trace of sugar whereas on the preceding day although the blood sugar content was lower the urine sugar was one plus (1). During the glucose tolerance test the pa-

tient took in 100 grams of glucose and excreted in the urine 16.76 grams.

The practical points illustrated by this case are the following. When glycosuria is discovered during pregnancy it may be and often is a sign of the initiation of the diabetic status when the earliest changes—the hydropic degeneration of the beta cells of the islands of Langerhans—are taking place. If the condition is cared for at this stage the patient stands a good chance of recovery of a restoration of the islands to a normal or nearly normal status as Copp and Barclay have shown by their work with dogs at the Physiatric Institute(2). These investigators undertook to discover the conditions under which the cells of the islands of Langerhans would regenerate. To this end they ablated about four fifths of the pancreas in each of a group of dogs and let the wound heal thus rendering the dogs

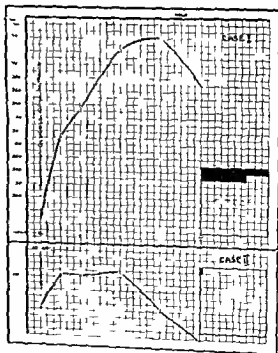


Fig. 1. Chart showing blood sugar curves in Cases 1 and 2.



Fig. 3 Dressed at pressure of 100 and 60 millimeters of mercury

Fig. 4 Dressed at pressure of 110 and 70 millimeters of mercury

cuts off the venous return from the leg exerts a pressure of 45 to 55 millimeters of mercury and that a dressing applied over a bony base of the forehead with all possible tension from a gauze bandage exerts a pressure of 85 to 100 millimeters of mercury.

We have dressed Wolfe grafts prepared and approximated as described with maintained pressures varying from 30 to 110 millimeters of mercury and determined that the higher pressures are disastrous to the flap. Grafts on one patient were applied with pressures equaling 60 and 100 millimeters of mercury (Fig. 3). Some areas of the 60 millimeters graft lived after a long questionable period and the greater portion of the 100 millimeters graft softened and came away (Fig. 3). Grafts on another patient were applied at pressures of 70 and 110 millimeters of mercury. They promptly became gangrenous and were removed (Fig. 4). For this purpose flat moderately thick walled balloons were constructed to produce accurate approximation and maintain the pressure desired. It was observed that stretching of the gauze bandage holding the dressing in position allowed the pressure to fall during the first 2 days and required frequent correction until the stretching ceased. The use of lint band-

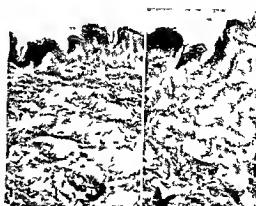


Fig. 5 At left skin under normal tension and contracted skin

ages and adhesive reinforcement corrects this condition.

The proper pressure must be that pressure which insures maximum nourishment lymph to the part and the graft and prevents fluid collection with consequent flap separation.

Ludwig and his pupils advocated and maintained the importance of the mechanical factor of filtration of blood plasma through the capillary walls as a source of lymph. Stirling determined that the quantity of lymph is usually proportional to the height of the capillary pressure. This being true any factor which will raise the capillary pressure will favor the increased flow of lymph. Further we know that the peripheral venous pressure varies from 5 to 15 millimeters of mercury and that the arteriole pressure ranges from 40 to 50 millimeters of mercury. A pressure then which will compress the venules that is more than 15 millimeters of mercury and will partially compress the arterioles meets our requirement. A dressing at a pressure of 30 millimeters of mercury has been very satisfactory in our experience.

This same care is not vital to the success of split skin grafts. Any inert material will serve to approximate this graft. A simple technique consists in smearing the source of the graft with a thin layer of vaseline which materially facilitates the cutting of the piece and arranging the pieces raw surface outward on dental impression compound which has been molded to the part to be covered. This is applied with a firm bandage without measuring the pressure. The author does not believe that the various types of wet dressings, powders, etc. are essential to the success of grafts.

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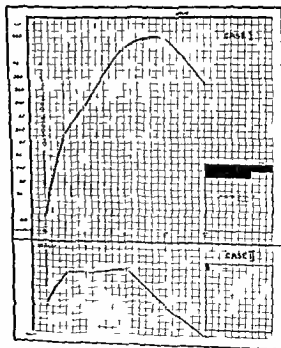


Fig. 1. Chart showing blood sugar curves in Cases 1 and 2.

SPECIMENS REMOVED ON THE TWENTIETH DAY
(FIGURES 9 AND 10)

Autograft Section of upper layers of skin showing the epidermis is in excellent condition with growth activity. The corium likewise is returning to normal.

Section through deeper layers showing the wide zone at the base of the graft of well organized repair tissue.

Isograft from a donor with compatible blood Section through upper layers. Absence of epidermis and only a few remaining strands of former corium which is degenerating and surrounded by granulation tissue containing phagocytic cells.

Isograft from a donor with non compatible blood Section showing almost complete removal of former corium, one small island remaining in the center of field. Masses of granulation tissue infiltrate with phagocytic cells.

These essentials to the growth of full thickness grafts have been advocated by the author for a dozen years. The principal of cutting to exact size and carefully approximating to maintain

normal tension was advanced by him and practiced by several operators with considerable success in The Queens Hospital in England during the War and has since been urged on numerous occasions. It is to be hoped that the substitution of sound scientific proof for former theory will stimulate a wider application of this very useful procedure.

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been performed and an appendectomy 7 years before.

The patient had been referred to me by her obstetrician who 2 weeks before had found sugar in her urine. The frequency of urination had been increasing so that when I first saw her she had to get up every 2 hours during the night. When I first saw her her fasting blood sugar was 73 milligrams per 100 cubic centimeters of blood and there was no glycosuria. Three days later I made a glucose tolerance test the results of which are illustrated in the chart (Fig. 1 Case). This normal curve shows that we were dealing with a patient with a low renal threshold for sugar for although the highest blood sugar excursion was 138 milligrams per 100 cubic centimeters of blood glycosuria was present at the end of the first and again at the end of the second hour. The total output of sugar was but 0.47 grams in marked contrast to the output of the first patient.

The two cases here described show the two contrasting findings in cases in which glycosuria is present in pregnancy. They show that the glycosuria in itself is but a symptom and

is not of final diagnostic significance, but that it calls for further investigation. The first case required treatment for diabetes while the second case did not require such treatment. On the one hand to disregard the presence of sugar in the urine in such cases might mean that the patient would be deprived of a vitally needed protection and on the other to subject every such patient to the routine treatment for diabetes might mean a dietary restriction and a psychic strain which the patient could and should be spared.

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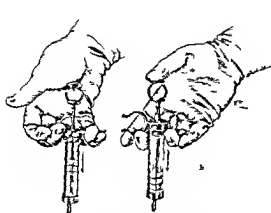


Fig. 3 a Injecting with ball of thumb and ring of plunger and fingers through rings b Injecting with thumb on plate over ring of plunger and finger beneath rings

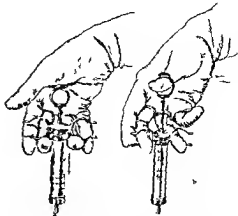


Fig. 4 a Ball of thumb over ring of plunger for injecting and other fingers beneath rings b Filling syringe by pulling up, upward on plunger with thumb in ring of plunger and other fingers in rings

five different grips the most comfortable one depending on the size of one's hand, the amount of solution in the syringe and the amount of pressure desired (Figs 1, 2, 3 and 4). The effect is to produce the desired pressure at all times and although high pressure may result disastrously to the syringe nevertheless there are times when it must be produced. A field block in the scalp for instance often requires that the solution be injected with more than the average pressure. This grip or handle has slightly increased the bulk and weight of the syringe but when the barrel is full of solution the instrument has a very satisfactory balance. For those who inject many patients in succession this grip affords a certain amount of rest for the hand inasmuch as the four fingers are divided and two may be placed in each split ring instead of one. The preferable grip on a syringe is with the thumb, middle and ring fingers whether two fingers are in a ring or not. Aspiration and refilling are accomplished with one hand (Fig. 4b) if the piston has been carefully ground to fit the barrel otherwise it would stick and require the use of both hands to fill the syringe.

The needle has been especially prepared for the injection of the abdominal wall. The shoulder of the needle has been tapered to join with the shaft giving it the appearance of an awl (Fig. 1). It is possible to dilate the skin perforation so that injection may be made without any drag on the shaft of the needle. By eliminating the friction of the skin against the shaft of the needle the jerk of the needle as it punctures the fascia has been

exaggerated. For the novice this is a safeguard in the ordinary abdominal injection for the experienced operator it is a safeguard when fascial layers are so thin that with the ordinary needle there is no jerk when they are punctured.

The needle after being firmly attached to the syringe is passed through a wheal already raised. It is then thrust parallel to and immediately below the surface of the skin until the entire shaft is buried. The tapered shoulder is then forced in after the shaft until the hole in the skin has been dilated sufficiently to permit an entirely free motion of the shaft through it. If the shaft should break it would still be subcutaneous and parallel to the surface and therefore easily removed by forcing it on through the skin and upward to the outside by pressing downward and forward against the broken end of the shaft at the same time with the forefinger of the other hand pressing the skin down and against the sharp point of the needle. After part of the solution has been injected subcutaneously the needle is withdrawn until the point lies just under the original wheal. It is then advanced downward and the fascia is searched for. When found this is perforated and about 2 cubic centimeters of solution injected there. The various necessary fascial punctures are thus accomplished with a feeling of satisfaction that the peritoneal cavity has not been pierced. Patients with such thin or delicate fascia that they cannot easily be felt constitute a considerable number of the cases to be injected and are obviously of considerable concern. It is common knowledge that the needle occasionally enters the

CLINICAL SURGERY

FROM THE CLINIC OF PROFESSOR PIERRE DUVAL INTERNAL DRAINAGE OF THE COMMON BILE DUCT¹

By J. GATELLIER, PARIS, FRANCE
Att. d. 5^e ann. Hosp. 14^e V. grad.

THE great majority of surgeons institute external drainage of bile after opening the common duct. While drainage of the biliary passage is a measure of necessity yet it seems illogical to establish external drainage for if the flow of bile is directed toward the duodenum it is a much more physiological procedure as the bile then follows its natural course. For this reason Professor Pierre Duval considers internal drainage the procedure of choice and believes that it should replace external drainage with the T tube.

DISADVANTAGES OF EXTERNAL DRAINAGE

The principal disadvantages of external drainage are the following:

a. The necessity of packing the liver bed with gauze, the slowness in healing of the abdominal incision facilitating the formation of postoperative hernia and the forming of peripyloric and penduodenal adhesions which may result in stenosis and cause late digestive troubles.

b. The absence of bile in the duodenum. Although loss of bile through external drainage is only temporary and incomplete yet there is enough loss to cause disturbance in the digestion of fats and an insufficient utilization of them. The absence of bile is unphysiological. Patients suffering from liver disease are especially in need of all their biological resources to aid in rapid convalescence. The loss of weight and the almost cachectic appearance of patients suffering from a prolonged loss of bile are well known.

Certainly the ideal operation would be cholecystotomy followed by immediate suture of the common duct. However this procedure is not free from untoward and sometimes very serious results. Dilatation of the papilla to assure permanent drainage toward the duodenum as advised by Moynihan seems to be more effective theoretically than practically. As to the choledochoduodenostomy although successful this

operation has proved to be more dangerous than has duodenal drainage.

PRE OPERATIVE PREPARATION OF PATIENTS

Patients suffering from obstructive jaundice are subjected to the same type of examination as are patients suffering with all liver diseases and are prepared for operation accordingly. These preparations include tests to determine the blood urea, blood sugar, the quality of blood and coagulation and bleeding time. An attempt is made to restore as far as possible the biological equilibrium to regulate the urea level by dietetic measures to restore normal coagulation and bleeding time by intravenous injections of calcium chloride. Subcutaneous injections of liver extracts are made to furnish a momentary compensation for the functional insufficiency of the liver. Rectal drips of saline with glucose are given in quantities of 1500 cubic centimeters daily.

The benefit of complete rest—absolute relaxation—should be given to the patient before operation. Enemata are given to empty the bowels thoroughly. Whether jaundiced or not the patient should be operated on when the fever has subsided. Naturally internal drainage can be applied only when none or hardly any infection is present in the biliary tract or if a sufficiently long period has elapsed since the last flare up. In the presence of septic cholangitis external drainage should be done.

Careful roentgenographic examination should be made not only to confirm the diagnosis of stone in the gall bladder and common duct but also to detect any possible abnormalities in the



Fig. 1. Drain with fenestrated metallic tube and stylette for transvenous drainage of the common duct.

any muscle disturbance and with the technique here described no sloughs of any moment what ever have developed. Among the first cases there were several sloughs due to the placing of too large a volume of alcohol through single puncture wounds and also to injecting by mistake into the skin instead of under it. After an injection there is a noticeable numbness of the perianal skin but no disturbance of the sensory features of the act of defecation. There is a remarkable return of the skin to normal appearance within a few days after injection.

The principle upon which this treatment is based is the well known destructive effect of alcohol on nervous structures. It is analogous to the alcohol injections for trigeminal neuralgia. In the latter case there are a few definite nerve trunks to be reached. In the case of pruritus the objective is the network of fine terminal sensory filaments that supply a varying area of skin. Hence the difference in technique. An alcohol injection does essentially the same thing as the surgical division of these cutaneous nerves as aimed at in the Ball and Lynch under-cutting operations and does it in a better and less objectionable way.

In the first publication on this subject reference was made to the experimental development of the method on animals by which the technique was worked out.

This treatment has been in use now for over ten years in the Rectal Clinic of the Johns Hopkins Hospital. During this time something over two hundred injections have been performed by Drs. A. H. Hebb, William Noble and myself. Numerous other surgeons of my acquaintance

have employed it occasionally. As a result of this experience the following conclusions may be drawn:

CONCLUSIONS

An injection properly performed by the technique herewith described gives prompt and complete relief. There are no serious complications or disadvantages to fear. With care, sloughing may either be avoided entirely, or reduced to a negligible degree. There is no prolonged hospital stay, no repeated treatments nor disagreeable applications to be made. The freedom from itching lasts for a variable and unpredictable time. A few cases are apparently cured yet in such case a recurrence developed after 6 years of complete freedom and was then re-injected. A number of patients have had relief for several years. Some develop itching again within 3 months. The greater number seem to be clear for from 6 to 12 months and then again are annoyed by the itching. Rarely is this as intense as at the time of the first treatment. There is no objection to repeating the injections as often as may be necessary. One patient a physician had his first treatment about 9 years ago and has had two others in the intervening time several years apart. It is freely admitted that this tendency to recurrence constitutes the great defect in the method. On the other hand it is eloquent evidence on its behalf that a number of patients who have tried almost every other form of treatment having received one alcohol injection return when necessary for a second or a third injection in spite of recurrence and with a wide experience of the possible alternatives.

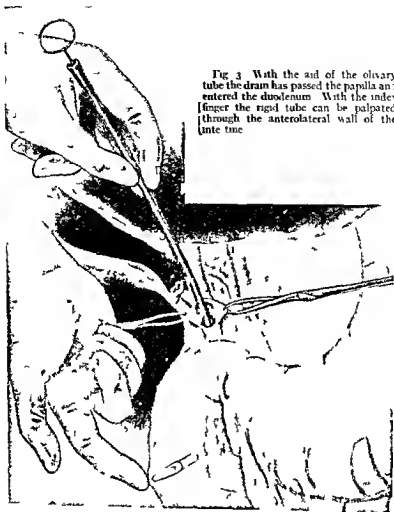


Fig 3 With the aid of the olivary tube the drain has passed the papilla and entered the duodenum. With the index finger the rigid tube can be palpated through the anterolateral wall of the intestine.

the papilla is dilated sufficiently and the sound passes into the duodenum.

At this stage the drainage tube is inserted. This drain (Fig 1) is made of rubber and has a metal perforated tip. A metal stylette may be inserted to make the tube rigid.

With the right index finger we lift up the common duct and push the tube in through the opening (Fig 2). Gradually the sound is pushed in until finally the metal tip disappears behind the pancreas. We then place the right hand on the duodenum and palpate the tip as it enters the bowel. First the metal tip then the rubber tube passes the papilla. The tube within the papilla produces a circular band which is easily felt. The metal tip can be palpated through the duodenum and when it is well in place the stylette is removed (Fig 3).

It is advisable to insert the tip of the drain as far as the third portion of the duodenum. The rubber part is cut long enough so that a small section may be left in the hepatic duct. The common duct is now completely closed (Fig 4). The liver bed and cystic stump are covered with peritoneum. A rubber drain is placed under the liver exceptionally closure without drainage can be done.

It is well to note that in certain cases in spite of the preliminary dilatation and the presence of a metal tip the tube becomes stuck at the papilla, curl up and cannot be made to pass the obstacle. If this occurs the duodenum is opened (Fig 5). The papilla is then dilated under direct vision and may even be incised if necessary. The sound is grasped with a forceps from the duodenum and drawn into its lumen. The duodenum is

improvement followed and in March 1925 the pulse rate averaged about 90 and there had been a gain in weight of 10 pounds. She resumed her work in a shop but that apparently caused a relapse and in May she returned with the former symptoms much increased. The previously pallid skin was somewhat pigmented the exophthalmos was pronounced the previously soft thyroid felt dense the pulse rate averaged 130 the systolic blood pressure was 140 the weight was 87 pounds. There was some diarrhoea little or no subcutaneous fat and distinct muscular atrophy in the hands and forearms. In short she presented a bad operative risk.

After 2 weeks in bed with the former medication of iodine combined with a glycerin extract of adrenal which seemed to check the rather frequent bowel movements there was some improvement in the nervous irritability and the pulse rate averaged about 120.

On May 13 1925 under gas-oxygen anaesthesia the isthmus of the gland was excised and each lobe resected to approximately the normal size. In spite of the previous ligation of all four of the chief thyroid vessels the hemorrhage was quite trouble some apparently coming from the thyroidea ima. The cut surfaces of the gland as in the previous case resembled liver tissue. At the close of the operation the pulse rate was 160 to 180 and during the afternoon ran to between 170 and 190 and the temperature had increased to 103. The restlessness was partly controlled by morphine.

On the following morning the pulse rate was difficult to count but probably did not reach 200 and the restlessness had been succeeded by stupor. The temperature was 103.5 degrees F. Twenty minims of thyroid residue were then given every 2 hours hypodermically. In the afternoon consciousness was so fully restored that she rejected vigorously to the hypodermic need and the pulse rate had begun to decrease. The next morning the pulse rate and general condition were so obviously improving that the hypodermic medication was suspended. In the evening of the third day after operation the pulse rate had decreased to 100 and a week later was practically normal.

I have seen other patients who developed similar symptoms referable to the central nervous system but not another in stupor who recovered either with or without the hypodermic administration of thyroid. In this particular instance it seemed to be life saving.

CASE 3. Miss A. S. age 16 was first seen in May 1915. She gave a history of scarlet fever 2 years previously. Six months after recovery the goiter was noted. This gradually increased in size and then exophthalmos appeared. There was a pronounced pallor when at rest but the least excitement or exertion produced a flush of and moist skin there was pronounced exophthalmos more noticeable in the right than in the left eye. There was a large firm goiter extending from the supraclavicular region well above the thyroid cartilage (higher on the right than the left side). There was a distinct purr in the easily palpable superior vessels. The pulse rate averaged 130 the systolic blood pressure was 120 the weight was 120 pounds the metabolism was taken at only 35 but the other symptoms seemed to indicate a bad operative risk.

June 2 1925 both inferior thyroid vessels were ligated under local anaesthesia. As a preliminary operation this is simpler and subsequently much less painful than the common ligation of the superior vessels.

On June 9 the pulse rate had decreased to an average of 100 and the temperature which had varied between 100 and 101 was normal.

June 10 1925 under gas-ether anaesthesia after both superior vessels had been ligated the right lobe was resected to nearly the normal size and the superficial part of this lobe with the isthmus removed. While the left lobe was being resected the pulse suddenly began to be very feeble and rapid as could be noted by the bleeding vessels and by the anaesthetist. Its rate could not be accurately counted but it was above 200. Thirty minims of the thyroid residue were then administered hypodermically into the left arm and the operation continued. But 5 minutes after the injection the heart beat became evidently stronger and after the wound was closed the pulse rate was counted at about 200. Thereafter for 24 hours 20 minims of the thyroid residue were given hypodermically at intervals of 2 hours. The temperature did not go above 103 and comparatively little of the usually threatening nervous irritability developed.

The pulse rate under this treatment steadily declined and on the second day after operation was 120. For the next 3 days the thyroid residue was given every 4 hours and then stopped as it seemed to produce no further benefit.

On June 20 the pulse rate was 100 respiration 20 and the temperature normal.

This patient like the other two seemed thus to be saved from a very dangerous condition. Without the thyroid residue given during the operation I feel sure she would have died. In none of these cases was any ill effect noted.

This does not mean that the extract is harmless because I have tested it in patients who were under the usual medical treatment for severe hyperthyroidism and it evidently intensified the disturbance.

The medical crises of hyperthyroidism do not usually develop with such startling rapidity as do those which follow operation. Furthermore the evidences of total absence of colloid are not so clear. The appearance of the cut surface of the gland during the operation and the necessary accompanying traumatism which should temporarily stop the functioning of this organ supply good reasons for the administration of an active thyroid extract. Because the more prolonged types of the disturbance are often intensified or at least not manifestly benefited by this treatment I have hesitated to employ it and in the postoperative toxæmia I think I have hitherto generally waited until it was too late. After the central nervous system has become badly damaged no treatment can prevent death. But when alarming symptoms appear during the operation or immediately afterward I do not hesitate to administer the thyroid residue in 10 or 30 minim doses every 4 hours. I believe that under these conditions it is entirely harmless and can be more beneficial than any other treatment.

FROM THE OBSTETRICAL CLINIC OF THE LONG ISLAND COLLEGE HOSPITAL

TECHNIQUE OF TRANSPERITONEAL CÆSAREAN SECTION

BY JOHN OSBORN POLAK, M.D. F.A.C.S. BROOKLYN
Professor of Obstetrics and Gynecology, Long Island College Hospital

WHILE it is an admitted fact that throughout this country too many cesarean sections are being done it is likewise true that in many of the conservative clinics too few have been done. At times because of the delay necessary to give the woman a test of labor this conservatism has cost not only the life of the child but because of the consequent starvation and exhaustion incident to this test has contributed to the high maternal morbidity and mortality attending late section.

After a woman has become exhausted a condition which is evidenced by her restlessness, rise in pulse and temperature, molding of the uterus and gaseous distention of the abdomen, section is fraught with great danger. However, this danger may be minimized by the following steps which are employed as routine in our clinic in handling cases of dystocia.

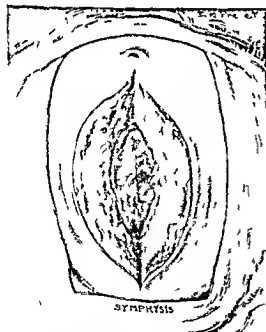


Fig 1. A median incision is made through the skin fat and rectus fascia showing dusky peritoneum over pregnant uterus.

1. Pelvic disproportion or fetal malposition should be recognized either before or immediately at the beginning of labor. This presupposes some prepartal study, as for instance, the determination of the size of the pelvis, the relative size and position of the head, its malleability, the inclination of the brim and the axis and direction of the uterine drive.

These points are readily recognized in the case of actual contraction. It is however the

2. Borderline case in which there is but slight disproportion with perhaps nothing but slight deflexion of the vertex that requires the greatest obstetric judgment. Since over 80 per cent of labors in borderline contractions terminate spontaneously or by the aid of low forceps it is well in these cases to allow the woman to have a moderate test of labor—this is best given in bed, conserving her strength by rest, the free use of morphine and scopolamine, forced feeding and the forced in

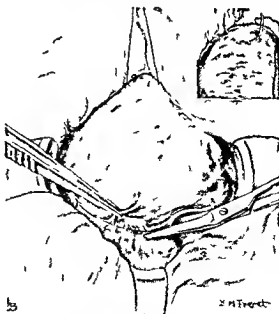


Fig 2. A Traction stitch. B Separating bladder reflection. Incision walled off with gauze packs. This case had a very low bladder attachment.

to toxin is due to variation of sympathetic tone and experimented with drugs acting on the sympathetic nervous system. Pilocarpine used on guinea pigs was successful in combating the action of the lethal dose of eclamptic serum. One patient who had had nine convulsions was given 5 milligrams of pilocarpine 3 times in 24 hours. She had no convulsions after the first dose and recovered. The work of these authors helps to disprove the agglutination theory as they found that after inoculating animals with eclamptic serum injection of sodium citrate prevented coagulation but not death.

The influence of diet and faulty elimination has practically been proved by the clinical results of treatment directed toward the correction of errors in these particulars. Warnekros showed that in Germany during the war eclampsia was much less frequent. At that time there was little fat and protein to be had and pregnant women were forced to live on a low protein diet.

In treating eclampsia, one should bear in mind all the possible causes and direct his efforts toward combating them. The chief difficulty lies in placing proper value on the various etiological factors. At present obstetricians are divided into two schools, one believing that removal of the products of conception is all important and the other preferring to treat the toxæmia primarily, leaving the evacuation of the uterus to nature or to nature slightly assisted.

The evil consequences of accouchement force and other brutal methods of rapid delivery caused the obstetricians of former days to devote their efforts toward more conservative means of treating eclampsia. Then with the advent of asepsis and the increased safety of cesarean section delivery by the abdominal route came into favor. This is without doubt the easiest way in which to terminate pregnancy and if simple evacuation of the uterus would cure eclampsia there would be no need for further investigation of the subject. It has been shown however by statistics gathered from the whole world that the mortality following cesarean section in eclampsia is over 30 per cent.

Originated by Stroganoff and popularized by Rotunda Hospital, a conservative method of treating eclampsia and pre eclamptic toxæmia has with many modifications been widely adopted. Though carried out in various ways, the principles of treatment are constant. The objectives sought are sedation, elimination and in some cases hastening evacuation of the uterus. Eden concludes after a study of the methods of treatment in England that natural delivery assisted deliv-

ery, or induced labor give twice as good results as cesarean section. In general the mortality after conservative treatment is 10 per cent.

Stroganoff uses chloroform and chloral hydrate as sedatives. In this country we are taught that these drugs cause liver necrosis and therefore are contra indicated in eclampsia. At Rotunda morphine is used though not in the massive doses formerly recommended.

In the obstetrical service at Freedmen's Hospital, we have attempted to employ in the treatment of eclampsia every method which seems to have value.

We believe that the convulsion in itself is a source of grave danger. As Stroganoff says the convulsion causes temporary asphyxia and cardiac dilatation, an increase in nervous irritability and depression of the kidney secretion. The general muscular contraction increases the amount of toxin thrown into the system, weakens the organism, and hastens the fatal outcome. We attempt to control convulsions by the use of morphine. One half grain is given hypodermically at the first convulsion or when the patient is first seen. One quarter grain is given with each succeeding convulsion until the respirations fall to ten per minute. We feel that whatever locking up of secretions may be caused is more than offset by the sedative effect. We believe also that the effect on the fetus is negligible. No anæsthetic is used to control convulsions. A general anæsthetic prevents the inhalation of air. What the patient needs is oxygen and after each convulsion a few breaths of oxygen are administered to combat cyanosis.

Elimination is effected by stomach lavage until clear return and colonic irrigations of 5 gallons of fluid. For each of these procedures we use 5 per cent sodium bicarbonate solution. After the lavage 2 ounces of magnesium sulphate are introduced through the tube. Neither of these treatments is given until after the patient is well narcotized by the morphine as such manipulations tend to induce convulsions. Formerly the colonic irrigation was repeated several times at 4 hour intervals. We have found however that one flushing seems to clear the bowel and we try to avoid further disturbance of the patient.

If the blood pressure is above 170 millimeters venesection is performed. We consider this procedure to be of the greatest importance. By it we lower the blood pressure, relieve the heart, lessen oedema of the brain and probably remove actual toxin. We withdraw 600 to 1000 cubic centimeters or less if the blood pressure falls to 130 millimeters.

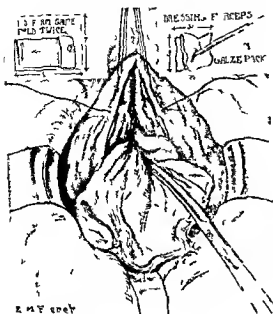


Fig 5 Iodoform gauze is packed into the contracting uterus

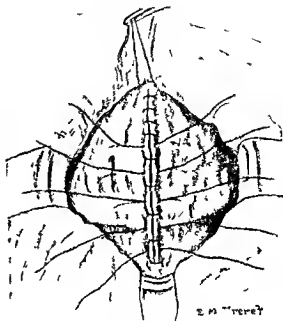


Fig 6 First row of sutures tied Second row of sutures in place

the uterus with the bladder carried up to about the middle of the wound (Fig 1). The wound edges are now protected with wet gauze towels and retracted with retractors—a traction suture passed through the uterus and grasped with forceps holds the uterus taut against the anterior abdominal wall (Fig 2). The bladder reflection of peritoneum is now sought near one round ligament and picked up with tissue forceps incised with a pair of curved Mayo scissors which are passed beneath the uterovesical fold and spread to separate it—this allows the superficial layer of peritoneum to be cut across (Fig. 2) care being taken not to get into the deeper tissues and so traumatize the superficial veins. The bladder is then detached by blunt dissection as in hysterectomy and retracted with a Deaver retractor. With traction on the traction suture above and retraction with the Deaver retractor below the uterus may be readily incised with little or no bleeding unless the placenta happens to be under the uterine incision (Fig 3). Care must be taken to make the uterine incision of sufficient length to permit of the easy expulsion of the head by pressure from above upon the uterus through the abdominal walls—or with the Zeilheim lifter which slides it out by a shoe horn action.

It is best when possible to deliver the child by the head for podalic version and extraction are

apt to extend the incision in the uterus and cause irregular tears of the uterine muscle. When the child is delivered the cord is clamped in two places by an assistant and cut between clamps.

The traction suture at the upper angle of the wound holds the uterus against the abdominal wall and prevents any eventration of the intestines. The uterine wound is now sutured the suture beginning at the upper angle. No chromic catgut is used on a Hagerdorn needle. Each suture in the upper third of the wound passes through the serosa the entire thickness of the uterine muscle on the one side just skipping the endometrium and through the muscularis and serosa on the opposite side. Of course in the lower two-thirds only the muscle is included in the stitch. These sutures are placed at half inch intervals. Their ends are clamped and held.

The time consumed in placing the sutures allows the uterus to contract and retract and separate the placenta (Fig 4). In clean cases we have found it best to allow the placenta to separate spontaneously and then after its removal to pack the cavity of the uterus with washed iodoform gauze (Fig 5) leaving the gauze *in situ* to be delivered through the cervix by uterine contraction. After the placenta is delivered and the gauze inserted the sutures already *in situ* are tied and closure of the uterus is completed by placing superficial sutures

CORRESPONDENCE

THE CORPUS LUTEUM AS THE SOURCE OF THE FOLLICULAR HORMONE

To the Editor From the article of Charles G Johnston and Victor L Gould entitled "The Corpus Luteum as the Source of the Follicular Hormone" which appeared in your journal in February (1926 xlv 236) it is impossible to determine when the experimental work was completed and on what date the manuscript was given into your keeping. Whether or not completed before June 6 1925 it certainly must have been feasible at least during the final revision of the proof to have considered the article of Robert T Frank and R G Gustavson entitled "The Female Sex Hormone and the Gestational Gland" (J Am M Ass 1925 lxxiv 1715 June 6) which more than covered the ground of Johnston and Gould's research and which explains why these authors obtained negative results with corpus luteum. The questions involved are of such fundamental importance to the profession that I feel justified in correcting the impression conveyed by Johnston and Gould.

The only deductions that can be drawn from their paper are (1) that the authors have overlooked some of the recent literature and (2) that they have failed to obtain potent corpus luteum extracts.

An analysis of Johnston and Gould's article shows that 23 different corpus luteum preparations were injected into 42 rats (Table I) and that 4 corpus luteum preparations were injected into 4 immature rabbits (Table II). The results were uniformly negative in both series.

The method of preparation of the corpus luteum extracts was according to the procedure described by Doisy Ralls Allen and Johnston (J Biol Chem 1924 lxi 711) which may be summarized as a fractional extraction by means of alcohol acetone and ether differing in but minor ways from the methods described by the pioneer Iscovesco in 1912 (Compt rend Soc de biol 1912 lxxii 104) and since then utilized with variations by practically all the workers on this subject.

Much emphasis is justly placed upon the employment of fresh ovaries in order to avoid post mortem diffusion and the shelling out of corpora lutea by skilled personelle in order to avoid inclusion of follicle fluid with the corpus luteum mass because this error would cloud the result.

The amount of tissue employed to obtain extract in the rat experiments varied between 10 and 60 grams. The authors do not state whether this

represents the amount given each animal or distributed among 1 to 6 animals nor do they record the amount of lipid obtained by extraction. Therefore no exact comparisons of our work and theirs is possible.

Table II which deals with the injections into normal immature rabbits will not be considered because in a previous paper Johnston as well as Allen Doisy et al (Am J Anat 1924 xxxiv 133) objected to my use of virgin rabbits *presumably adults* (the italics are mine) with ovaries intact. This addition of the phrase *presumably adults* is indeed pure presumption on the part of these authors as in a letter (J Am M Ass 1923 lxxxi 1133) in which I drew attention to another misquotation of my work by Allen and Doisy I specifically stated that "I have used immature animals long before oestrus could occur."

This letter was replied to by Allen and Doisy and therefore noted. However to avoid any possibility of further misinterpretation misunderstanding or misquotation I will not refer to the numerous experiments performed on rabbits although their validity cannot be questioned but will confine my proof entirely to the smaller series of material tested on castrated rats by the vaginal smear method of Stockard and Papanicolaou.

In the subjoined table our positive results only are recorded but emphasis must be placed on the fact that in our preliminary work 47 batches or fractions proved negative. Twenty seven batches proved positive and after errors and pitfalls of preparation had been mastered all of the last 20 batches gave positive results.

As detailed in our article (J Am M Ass loc cit) we found the active female sex hormone present in all corpora lutea most in yellow and least in the bloody or early corpus luteum. This seemingly bizarre fact is explained by the early vascularization of the yellow body immediately after follicle rupture which allows the hormone secreted by the corpus luteum cells to pass into the blood stream where we have demonstrated its presence (Frank Frank Gustavson and Weyerts J Am M Ass 1925 lxxv 810) and prevents the corpus luteum from being a storage gland. Only when the capillary network begins to obliterate during involution (at the stage corresponding to the microscopic appearance of yellow) does storage of hormone temporarily occur.

from the operating room. The other treatment consists of routine morphia in $\frac{1}{12}$ grain doses every 4 hours for the first 24 hours, water on the cessation of vomiting, and a soft diet after the first 36 hours.

POINTS TO BE EMPHASIZED

The points that are important in this technique and need to be emphasized are: first, the low abdominal incision. Second, the placing of the traction suture in the uterus at the upper limit of the abdominal incision which, when held taut

makes a perfect occlusion of the wound. Third, the separation of the peritoneal flap, including the bladder. Fourth, the delivery of the fetus by the head. Fifth, the allowing of the placenta to separate spontaneously. Sixth, the packing of the uterus with washed iodoform gauze to stimulate its contraction and retraction. This gauze is usually found in the vagina at the end of 24 hours. Seventh, the complete occlusion of the uterine wound by the suture of the bladder reflexion over it which prevents the possibility of peritoneal leakage and intestinal adhesions.

did not think it necessary to revise our galley proof as the results described in this and other papers which appeared after we had mailed our manuscript did not alter our conclusions.

The second deduction drawn by Dr Frank concerning our failure to obtain potent corpus luteum extracts is in complete accord with our conclusions.

In regard to the amount of extracted tissue injected, we wish to state that each animal was considered individually and that the amounts stated were injected into one animal.

There can be no basis for comparison of Dr Frank's results with our own until the detail of his chemical procedures are made available. Dowsy et al (J Biol Chem 1925 lx 43) clearly state their method of preparation and the number of rat units obtainable from a definite amount of material as well as the total amount of solids in each rat unit. We stated that we prepared our extracts after the same procedure used by Dowsy et al and also give the weight and character of corpora lutea which failed to yield one rat unit.

As regards the freshness of the material used by Dr Frank we fail to find any reference to this important point. We feel that the only safe way to collect material for work such as is under discussion is an immediate removal of the corpora lutea from the ovary as it is removed from the freshly killed animal.

In regard to the discussion of the gestational gland we are forced to admit that we know nothing about the gland except as we have read of it from the articles of Frank and his collaborators. Aside from this source of information, we can find no reference to this gland so that our discussion upon this point would not be very illuminating.

We cannot agree with Dr Frank in his closing statement about accepting his ideas regarding the gestational gland for even if we accept his statements as true the physiology of sex and reproduction remains more or less a puzzle and a rich field for careful and painstaking research.

St Louis Missouri

CHARLES G. JONSTON
VICTOR L. GOULD



Fig 1 A The graft must be cut accurately to size
Fig 1 B Contrasted skin removed from area shown in A Note the relative size

ment may be carried to its cellular elements. Whole blood cannot accomplish this requirement and its collection beneath a graft causes it to perish. These considerations make it obvious that the commonly accepted advice to allow for contraction and to cut the graft one third to one half larger than the area to be covered is one of the commonest sources of failure. The graft must be cut accurately to size and maintained at normal tension (Figs 1 and 5).

For the same reason it must be accurately approximated by carefully placed sutures (Fig 2). The entrance of lymph from its circumference and the early ingrowth of vessels around this border are big factors in successful nourishment. Occasionally one sees a graft which lives for three quarters of an inch around its border and dies in the center as the result of faulty dressing.

The skin must be free from fat. Gillie says that the question of whether a graft shall be skin deep or contain a layer of fat is determined by the needs of the case, there being no marked disparity between the two in the matter of viability. This same claim was maintained by Hirschberg in 1893 and more recently by F. Krause and others. It is true that skin with its fat occasionally grows under very favorable circumstances but consideration of the source of its nourishment and an overwhelming experience to the contrary

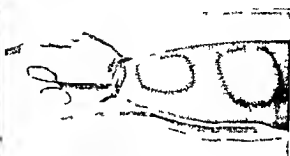


Fig 2 A Grafts applied at pressures of 60 and 100 millimeters

Fig 2 B Same skin approximated under normal tension

by many operators classifies this as an exception rather than a rule.

The graft must be accurately approximated to its base by a proper even pressure. The necessity for this approximation and pressure has been obvious to all of us but the means of accomplishing the approximation and the question of a proper pressure has given rise to endless opinion and controversy. Numerous dressings have been advocated to meet this requirement the most recent to win favor being the synthetic rubber sponge. The elasticity and compressibility of this product permits accurate approximation of all parts of the flap but it possesses none of the other virtues ascribed to it.

Various authors describe the proper pressure as gentle moderate firm very firm and a bandage so tight that it hurts. One may take a choice and guess at the dressing pressure which yields the most success because none of these terms convey the same impression to two individuals.

We have determined by experiment that the ordinary bandage used to fix dressings exerts a pressure upon the soft parts equal to 5 to 10 millimeters of mercury that a firm bandage exerts a pressure of approximately 30 millimeters of mercury that a very firm bandage one that is painful when applied to the thigh and

blood from 0.0 to 0.03 per cent may be increased to 0.1 or even 0.3 per cent. It seems reasonable to suppose that production of energy takes place in the same way in the striated muscles. One of the most interesting side lights on this study of lactic acid is the reconversion of the acid ($C_3H_5O_3$) in the muscles into glycogen ($C_6H_{12}O_6$) as the oxygen debt is paid, with a loss of one molecule of lactic acid in every five reconverted. It is interesting to note that two molecules of lactic acid make the glucose molecule ($C_6H_{12}O_6$) with which we are familiar.

There is a large group of toxæmias secondary to various acute diseases such as the high intestinal obstructions in which the body can not convert foods into fuel and the fire goes down and often out. The drop in bodily temperature, low blood pressure, coldness and clamminess of the skin, small rapid pulse, dry tongue and sordes on the teeth are tragic manifestations of a deadly toxicity.

Carbon, oxygen and hydrogen are the chief constituents of all food. Carbohydrates are the simplest form of fuel. Proteins in addition to carbon, oxygen and hydrogen contain nitrogen and usually a little sulphur. The nitrogen in some manner enables proteins to take on form and give stability to the tissues and permits the deposition of other elements such as calcium. Fats contain carbon, hydrogen and a little oxygen but require a great amount of oxygen for conversion into fuel and the hydrogen is but slowly freed from the carbon. Fats serve an extraordinary purpose, however, producing not only heat but also water which explains the ability of the camel with its hump and of the hibernating animals with their autumn fat to go for long periods without food or drink.

The sugars are produced under normal conditions in the liver from the digested carbohydrates and are the cheap, easily obtained

fuel, the common coal of our existence. Glucose can be artificially produced outside the body in almost the form that it is used within the body. The conversion of the amino acids of the proteins, the anthracite coal of the body into sugar is a slower process and more expensive and in the acute conditions under discussion usually means burning the body tissues and failure of elimination of the creatinin and urea, the ashes from the blood. The use of fat as a fuel to produce heat and energy is too slow a process to save life in acute conditions.

It has been pointed out by a number of observers particularly by Matas that the intravenous introduction of glucose solutions brings up the body temperature and gives to the vegetative system the energy necessary to life. Glucose given with large quantities of physiologic sodium chloride solution restores the chloride deficiency and also aids the elimination of the urea and creatinin. Now that we have by means of examination of the blood developed methods of precision for determining metabolic changes many patients apparently moribund can be lifted out of the pit so to speak and enabled to undergo a life saving operation that would have been otherwise impossible.

W. J. Mayo

DIATHERMY

DURING the last 25 years the position of electrotherapy in America has been one of almost total eclipse largely because it had been allowed to fall into the hands of quacks both in the profession and out of it and because disciples of the various cults had recognized in it a means of widening their scope and increasing their prestige. Under such circumstances it was but natural that conscientious physicians generally should not only look askance at this method of treat-

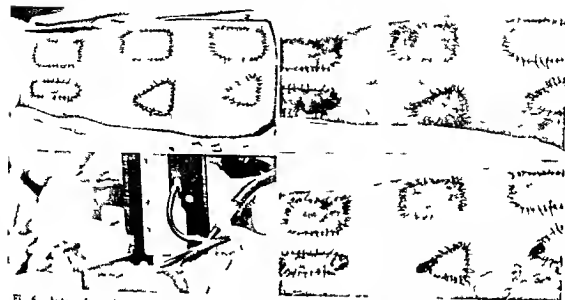


Fig 6 Autograft and control compatible isograft same blood type non-compatible isograft all dressed at

pressure of 30 millimeters mercury Above right second day below right fifth day

Finally the grafted part should be immobilized for several days. During the first 24 hours the graft is glued to its base by coagulated lymph which must not be disturbed.

The following general observations apply to autografts and compatible isografts during their early days of existence.

The presence of a parasitic foreign body the graft induces the reaction of inflammation with a resulting invasion of the corium by large numbers of polynuclear leucocytes.

The epithelium plays no part in the reconstruction and growth until new blood and lymph supplies are established. It frequently degenerates because of faulty nutrition during the period of parasitic lymph absorption before the establishment of a new blood supply.

The papillary area of the corium exhibits marked degenerative changes during the first few days. Some areas perish and substitution occurs from both the tissue of the host and the connective tissue of the graft.

Between the second and the fifth days there is a considerable proliferation of connective tissue cells and vascular endothelium which continues until the time of complete regeneration.

The elastic fibers degenerate late and are regenerated from surrounding elastic tissue.

The following histological observations are furnished by Dr W. M. German.

Histology of contracted skin and skin on normal tension. A Contracted skin Epidermis and

corium are normal in cellular structure. There is a contraction of the corium in all planes throwing the epidermis into numerous folds and causing much irregularity of the bundles of the intercellular substance. The blood vessels are contracted and empty and the spaces between the cells and connective tissue bundles are small.

B Skin on normal tension Epidermis and corium are normal in cellular structure. The connective tissue bundles of corium show a distinct tendency to be parallel to the plane of the skin surface. The vessels are contracted and not all of them are empty. The epidermis is not drawn into convolutions but shows a tendency to occupy a single plane. The spaces between cells and

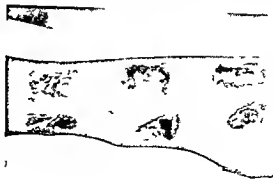


Fig 7 Tenth day

Diathermy is contra indicated in suppurative conditions until provisions for adequate drainage have been made. The tendency to employ diathermy promiscuously and without real indications is to be deprecated, instead of diminishing the widespread influence of the cults it can only serve to increase those evils. The secret of the advantageous use of diathermy lies in the thorough understanding of the underlying principles, the careful selection of patients and the close attention to the many details of such treatment. In many patients diathermy alone is not sufficient to bring about the best results; it must be combined with other forms of electrotherapeutics or physiotherapy. Hence, in any well organized clinic or hospital diathermy should simply form a part of the electrotherapeutic and physiotherapeutic armamentarium and should best be concentrated under one direction. Since the fundamental training of the radiologist enables him readily to master the principles of high frequency apparatus, he is specially designated to take up the method. In nearly all of the European clinics the radiologist and the electrologist are either one and the same person, or they are associated in the same department.

Recently an intensive commercial propaganda has led many physicians to take up diathermy without adequate preparation. The blame can hardly be placed on the manufacturers, who are actually in advance of the profession; it must fall on those who allow themselves to be induced to purchase such apparatus without knowing anything about the principles of its construction or about the proper application of the method. It is true that some of the manufacturers are offering short courses of instruction generally covering one week. Of course it is obvious that all one can learn in that time is how to operate the apparatus and something about its construction, but the mere idea of physicians going to manufacturers of apparatus for information on the indications and contra indications for this or that form of treatment constitutes an anachronism. The growing vogue of electrotherapeutic and physiotherapeutic methods due to increased knowledge of their scientific basis and to better instrumentation makes it imperative that our medical schools reconsider the subject and provide sound courses of instruction. No longer should physicians have to seek such information at the shop of the instrument maker.

A. U. DESJARDINS

AN IMPROVED SYRINGE AND NEEDLE FOR USE IN REGIONAL ANÆSTHESIA¹

BY JOHN S LUNDY M D ROCHESTER MINNESOTA

Section on Anæsthesia Mayo Clinic

THE syringe and needle herein described are modifications of those used by Labat and Meeker. The needle, however, has undergone but one alteration.

The syringe is made with a glass barrel with a capacity of 10 cubic centimeters and metal ends. The attachment for the needle is offset and equipped with a bayonet style lock. The piston is ground to fit the barrel and has been made with a piston ring. Heretofore there has been difficulty with this piston in that the solution would seep past it and accumulate on the wrong side of it. This difficulty has been minimized by increasing the length of the plunger. The barrel has not been lengthened purposely. When the syringe is filled with solution so that the lower border of the piston rests on the 10 cubic centimeter line, only a small space remains for the purpose of aspirating. This is desirable as experience has taught me that gentle aspiration is preferable to a more vigorous one which frequently plugs the end of the needle by attracting tissue instead of blood. On more than one occasion I have aspirated blood from the caudal canal on the third of three consecutive aspirations although the first two produced no blood. This resulted directly from three degrees of aspiration, the first being very forceful, the second less so while the third was gentle. I infer from such instances that an overvigorous tug on the plunger draws solid tissue against the bevelled tip of the needle and prevents an upward flow of blood. This is undoubtedly true when the bevelled edge of the needle lies against the thin wall of a vein. Successful aspiration of blood has a definite significance. The absence of blood on

the other hand may prompt a feeling of false security based on the belief that the needle is outside a blood vessel. As an additional precaution against misinterpretation, therefore, I very carefully and slowly inject three or four drops of the solution with the idea of freeing the tip of the needle from the tissue before gently repeating the aspiration. This is first done without moving the needle, then it is repeated while the needle is rotated. If no blood is obtained under these circumstances, one can be reasonably sure that the injection will not be into a vein. Nevertheless the solution going into the caudal canal should be injected very slowly while the patient is closely watched for signs of the sudden reaction characteristic of an intravenous injection.

The handle or grip on this syringe consists of a finger ring on the end of the plunger. Small flat, metal rests occupy the top and bottom of the ring and provide satisfactory pressure bearing surfaces whether the thumb is in the ring or the ring pressed against the palm. Two finger rings split laterally have been placed on either side of the metal cap which screws onto the end of the barrel. The split ring permits the gloved finger to be withdrawn both laterally and longitudinally, so that the hand is easily disengaged. The use of rubber gloves while the injection is being made prompted the introduction of this new grip. The side rings together with the thumb ring permit

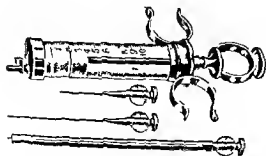


Fig 1 Drawing of syringe and needles.

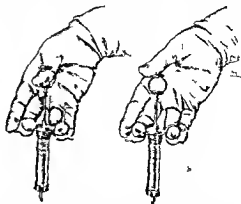
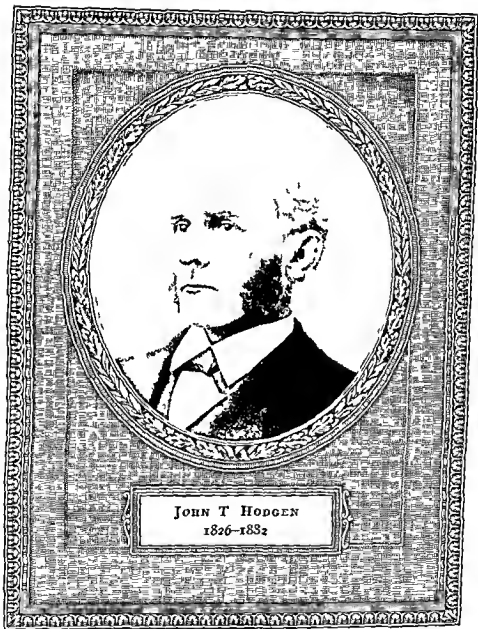


Fig 2 a Injecting with thumb through ring of plunger and fingers in rings b, Injecting with thumb above ring of plunger and fingers in rings



JOHN T. HODGEN
1826-1882

abdominal cavity and even though damage is seldom done it is to be avoided if possible. The tapered shoulder lends strength to the needle and for that reason it is used on needles of different sizes from those ordinarily employed in abdominal block.

The syringe and needles are easily sterilized by boiling. The syringe may be kept in alcohol between cases when frequently used. Needles are

freshly sterilized in boiling water. Information as to the care of syringe and needle may be found elsewhere.^{1, 2}

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PRURITUS AND TREATMENT BY ALCOHOL INJECTION

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THE purpose of this paper is to call renewed attention to a method of treatment for pruritus already published and to report further experience in its use.¹ There is no need for an elaborate general discussion of pruritus and. Some cases of itching about the anus are no doubt due to various local causes such as small fistulae, irritated skin tags, and pinworms, and a few may be reflex manifestations of some visceral lesion as Montague has urged or due to some general condition like diabetes. A fairly wide experience however leads to the firm opinion that true pruritus ani of the idiopathic type is a genuine clinical entity of characteristic appearance, the cause of which is entirely obscure at present. The intensity of the itching varies from a minor annoyance to a serious disturbance of health with loss of sleep and distressing nervous irritability.

There is no satisfactory treatment. The method herewith presented is not satisfactory for one reason: it is not as a rule permanent in its results. In this regard it is not different from other procedures. Otherwise it is by far the best treatment with which the writer is familiar and has afforded most welcome relief to many patients. The details of execution of the injections will be described and then a brief statement of its rationale and of our results will be presented.

The patient is placed in the lithotomy position under light general anesthesia. ethylene gas is particularly suitable but nitrous oxide or light ether may be employed. Formerly local anesthesia was given in a number of cases but general narcosis is better. The infiltration of the tissues

with local anesthesia dilutes the alcohol and is otherwise confusing by distending the area injected. The field is prepared as for any operation and by the field is meant the whole of the area involved. At times this may extend backward over the sacrum forward about the genitalia and groins and laterally toward the buttocks. The patient can describe the extent of the involvement before operation but as a rule the inflamed and indurated appearance of the skin itself indicates the region to be injected. The material used is pure 95 per cent grain alcohol without denaturing substances. This is injected with the ordinary small hypodermic syringes with fine needles not over an inch long. Larger syringes and coarser needles may lead to placing too much alcohol in one spot or putting it in under too great pressure. The needles are plunged vertically entirely through the skin and the alcohol injected into the subcutaneous tissues. Only 2 to 4 drops are injected at each puncture. The punctures are spaced about $\frac{1}{4}$ inch apart and are stippled over the entire area involved. The injections are carried up to about $\frac{1}{4}$ inch from the anal margin but are not made within the anal canal itself. The scrotum labia majora and folds of the groins have been injected without resulting trouble. Blood vessels of course are to be avoided when possible.

After completing the injection the area is sponged off with a wet alcohol sponge. No dressing is used. There is little after soreness and if the injection has been properly performed the itching is abolished at once. When the method was first being developed there was some concern about possible sphincter paralysis and sloughing of the skin. In no case has there been

truths not to be forgotten In the East and the West in the North and the South his fame as a teacher is a glory to St. Louis He was exceptionally concise practical and comprehensive As a teacher of surgery he was incomparable His influence was however impressed not only upon individuals it also controlled institutions As dean of the faculty of the St. Louis Medical College he originated and consummated measures for its establishment on the basis of learning During the time that he was a potent factor in shaping its course the St. Louis Medical College established an advanced standard of work which no other institution in St. Louis dared to attempt until years later and then only under the pressure of enforcing laws

The high standard of the work of Washington University and the steady advance in the demands of the St. Louis Medical College not only upon the students, but upon the earnestness the unselfishness and the capability of the teachers finally led some years after the death of Dr. Hodgen to the union of the two institutions in the way that he had anticipated and desired Dr. Hodgen's last public speech was made before the alumni of the Washington University That speech was the echo of his life's striving a cry for "more knowledge more light" As a surgeon he was conservative always but quick, precise, and dexterous The quick precision of his actions was but the outward sign of a mind singularly active and exact

The difficulties of a case never seemed to surprise or overwhelm his judgment He had resources at command adequate for any emergency His keen powers of observation ever on the alert quickly seized the phenomena of disease and with precision his analytical mind traced them to their causation and led him to just conclusions as to the nature of the disease and its rational treatment

He had to a noteworthy degree mechanical genius which found play in the application of mechanical means to the uses of surgery Extensive observation with vast experience inspired his creative faculties which ever evolved original thought, new methods and admirable instrumental inventions The most noteworthy of his inventions were—a suspension splint for fracture of the femur a modification of the Nathan R. Smith anterior splint which was especially designed during the Civil War for the treatment of compound, gunshot fractures of the femur—a suspension cord and pulleys which permitted flexion extension and rotation in fracture of the leg a forceps dilator for removal of foreign bodies from the air passages without tracheotomy a wire suspension splint for treatment of injuries or fractures of the arm a hair pin dilator for separating the lips of the opening in the trachea in tracheotomy an excellent adaptation of simple means to an end

Dr. Hodgen's time was so fully taken up during the latter years of his life that his writings were not extensive Among his contributions were articles on "Wiring the Clavicle and Acromion for Dislocation of the Scapular End of the

THE TREATMENT OF THE ACUTE POSTOPERATIVE TOXÆMIA OF HYPERTHYROIDISM

By JOHN ROGERS M.D. F.A.C.S. NEW YORK CITY

THERE are few more dangerous conditions than the acute postoperative toxæmia of hyperthyroidism. In my experience it has occurred most commonly in those patients who present symptoms of marked exophthalmos especially if they have previously had a pallid skin or one which has become pigmented or bronzed or a perceptible muscular atrophy in the hands and forearms. It is also more to be expected in those with firm rather than soft thyroid glands. In postmortem examinations of the gland only a dense mass of cells has been found with little or none of the colloid material which is supposed to represent the secretion. In other words the patient dies apparently not from too much but from too little thyroid secretion or an entire absence of it.¹ For this reason I have for several years advocated in the treatment of the acute postoperative toxæmias the subcutaneous administration of a boiled aqueous extract of the thyroid. It seems to act by stimulation of the terminal filaments of the vagus or parasympathetic portion of the involuntary nervous system and so does not increase the already alarming rapidity of the heart action.² This extract is now commonly available in a form known as the thyroid residue. The detailed histories are given of 3 cases recent experiences in rather close succession of these serious postoperative toxæmias in which the patients seemed to be saved from death by the free administration of the thyroid residue.

CASE 1. Miss M. G. age 19 was first seen in December 1924. She apparently showed the beginning of rather typical symptoms of mild exophthalmic goiter. She had worked very hard the preceding winter at school. The general nutrition was good when she was quiet in bed the skin was pallid but flushed at the least excitement there was distinct exophthalmos and a small rather soft goiter. The pulse rate averaged 122 the systolic blood pressure was 140 and the weight 123 pounds.

On January 19, 1925 under local anesthesia both inferior and then a week later both superior vessels were tied. There was comparatively little reaction and much improvement which seemed to be promoted by the administration of a 2 grain iodide of iron pill daily with a glycenn ovarian extract.

In February with a normal pulse rate and a gain of 5 pounds in weight she went home where he was forced to take up a somewhat strenuous life. The hyperthyroid symptoms then began to reappear and in the latter part of

April, 1925 she returned to the hospital. The general nutrition was good but there was a marked and somewhat dusky pallor with distinct muscular atrophy in the hands and forearms. The exophthalmos was more pronounced than in December the pulse rate averaged about 130 the systolic blood pressure was 150 and the weight was 120 pounds the goiter was no larger but had become dense in consistency. With rest in bed and a continuation of the iodine and ovarian feeding for about 3 weeks the pulse rate decreased to an average of 115 but the gland remained very dense.

May 19, 1925 under gas ether anesthesia the isthmus of the thyroid was excised and both lobes resected so that they were reduced to an approximately normal size. The cut surfaces of the organ resembled liver tissue. At the end of the operation the pulse rate was 160. Four hours later it had risen to 180 but there was none of the extreme restlessness which in my experience indicates an impending fatality.

The following morning the pulse had risen to 190 and the temperature to 103 and there was nausea and more restlessness. The condition appeared very serious. 15 minims of the thyroid residue were then given every two hours by mouth rather than hypodermically as the patient vigorously resented the use of the needle. An almost immediate improvement followed. The nausea and restlessness decreased and within the next 48 hours the pulse rate dropped from 190 to 150 and the temperature from 103 to 101. As the danger seemed passed the thyroid feeding was then stopped and on the fourth day after operation the pulse rate had fallen to 110 and the temperature was normal.

The patient left the hospital at the end of the third week after operation with a pulse rate which averaged between 90 and 100.

In this patient there was so much fear of the hypodermic syringe that it seemed unwise to force it but the mouth administration of the thyroid extract seemed beneficial and was certainly not followed by any increase of nervous irritability nor acceleration of the pulse rate. Of course recovery might have taken place without it. Nevertheless recovery with a rapidly rising pulse rate and temperature before the administration of this remedy seemed doubtful.

CASE 2. Miss M. R. age 24 was first seen in September 1924. She had always been delicate and her present symptoms of typical exophthalmic goiter apparently followed an attack of psoriasis a year or more ago. In September 1924 she had been in bed for 3 months under small doses of iodine. The metabolism was +50 there was a moderate exophthalmos a rather dense and small goiter the pulse rate averaged 115 systolic blood pressure 130 weight 84 pounds.

In November 1924 under local anesthesia both inferior thyroid arteries were ligated and a week later both superior. A 2 grain iodide of iron pill was then given once daily and glycenn ovarian extract every 4 hours. Marked

¹Am. J. Med. Sc. 9 3 clay 77

²Am. J. Physiol. 9 5 22301 3

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By ALFRED BROWN M.D. F.A.C.S. OMAHA, NEBRASKA

ROGER OF SALERNO

Roger of Salerno more properly called Roger of Parma was the first outstanding surgeon of Italy to write a surgery and not depend upon the Arabian school for his ground work. He was born during the 12th century and probably lived into the 13th. It is likely that he produced his surgery which was known by various names during the latter part of the 12th century. Two names of the book are the *Practica Chirurgiae* and the

Post mundi Fabricam the latter being derived from the first three words of the preface of the book. It was so far superior to anything that had appeared up to that time and contained so much original material for it does not contain any of the Arabic teaching that it was at once taken as one of the principal works for use in teaching at the school of Salerno. Thus it is one of the landmarks in surgery as it marks the breaking away of continental surgery from the influence of the Arabian school. The book was not wholly the production of Roger's thought but rather stated the opinions and beliefs of a new school of surgery which was founded on the work of the old Greek masters with the results of original observation added. Who his collaborators were is not definitely established as Roger does not mention them by name but states simply that others helped and he wrote the book. The detail of giving credit to others by name was frequently omitted about this time and a little later Constantinus Africanus for example does not mention the source from which his work was obtained though much of his writing was word for word translation of such authors as Haly Abbas, Avicenna, Costa Ben Luca, Ishak Ben Soleiman and others. Following Roger was his pupil Roland who rearranged his work and published it under his own name though he does give credit to his master. He does not state however that much of it is copied word for word. Whether this plagiarism was intentional or not it is hard to establish as the writings were handed down in manuscript form for nearly three centuries and there was thus considerable chance of error. In the case of Roger of Salerno and his pupil Roland I have had the opportunity of making a comparison between an original manuscript of the thirteenth century (see illustration) and a printed book of

1541. The manuscript is on vellum, beautifully illuminated and is made up of 36 folios written in different 13th century hands. It contains among other things part of the surgery of Roger appearing under various headings. There is of course no title but above the initial letter is the statement "Hec beginneth the surgery of master Roger. Then comes the famous introduction beginning with the lines by which it is known *Post mundi Fabricam*."

After the formation of the world and setting it in order God made man of earthly substance and breathed the breath of life in him etc. Following the introduction is the table of contents and then the text of the book. The other volume carries us on a few centuries. It was printed by Henricus Petrus at Basle in 1411 and contains a book the title of which freely translated reads "A rational method of curing the ills of the human body internal and external written by Roland. Under the heading

Præfatio we read again the well known words *Post mundi Fabricam* and so on. Going on further we find that save for an occasional word or change in phraseology the manuscript and book are the same. The disciple has taken the words of the master arranged them a little better and made the work more understandable. In some places he may have added a little new material but the chief change and one for the better is the arrangement. Roger did however write one part of surgery which remained his even to as late as the 16th century for we find in this volume of 1541 eight pages devoted to a description of phlebotomy ascribed to Roger under the title *De Modis Mittendi Sanguinem et de eiusque utilitate Rogeri chirurgi peritissima Libellus*. In this work Roger gives the indications for phlebotomy and where the incisions should be made. For disease of the gums, mouth or teeth he advises incision of two veins under the tongue. His indications are at first general and then methods are given in detail. In one general statement he says "of the hip, tibia and foot we incise veins because of pain of the kidney and bladder and because of rheumatism, sciatica and podagra and constriction of the eyes and swelling which affects the legs and feet or on account of withdrawal of the menses or when women do not conceive. The last two seem to be rather contrary indications. Roger well deserves to be considered the father of the new surgery in Italy if not in Continental Europe."

Courtesy of Dr. LeRoy Crummett, Omaha, Nebraska.
Courtesy of the J. H. Oser Library, Chicago.

ECLAMPSIA ETIOLOGY AND TREATMENT¹

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ECLAMPSIA is an acute toxæmia occurring in pregnant parturient or puerperal women and is accompanied by clonic and tonic convulsions during which there is loss of consciousness followed by more or less complete coma and frequently results in death. In this definition by Williams is told all that is actually known of the etiology of eclampsia.

Many theories have been evolved the results of centuries of speculation by numberless workers in obstetrics few have withstood the test of time and experience. With each new theory as to the cause of eclampsia there has been proposed a new plan of treatment. Many of these methods have been discarded permanently others have been abandoned temporarily while one or two principles have up to the present time been universally recognized as correct.

Every theory which has been proposed as to the cause of convulsive puerperal toxæmia has some degree of plausibility and until our knowledge shall be greater than it now is no idea should be dismissed without careful consideration and absolute proof of its unworthiness. At the present time it seems true that the toxin of eclampsia originates in the product of conception, that it is eliminated principally by the bowels and kidneys and that it results in profound toxæmia when the digestive tract is not functioning properly. When to the fetal toxins are added the results of sluggish bowel action and a high protein diet the maternal organism is overtaxed. The most successful methods of treatment are those which combat the formation and retention of toxins in the alimentary tract.

It is generally recognized that there are two types of convulsive puerperal toxæmia one which seems to be due to primary kidney pathology and one the true eclampsia in which the first changes are found in the liver with nephritis as a secondary complication. The treatment is the same in both cases.

The etiological theories which have had the strongest support are (1) infection (2) glandular dysfunction (3) incompatibility between fetal and maternal blood (4) fetal toxins and (5) diet and faulty elimination.

Stroganoff has shown the similarity between eclampsia and acute infections noting the mode of onset the effect on all parenchymatous organs

the fact that there seems to be an epidemic form, and that one attack seems to confer immunity. Talbott found sepsis in the teeth of all of 97 eclamptics and believes that kidney damage resulting from these foci of infection is the primary cause of eclampsia. McIlroy stresses dental prophylaxis in the prevention of toxæmia. Focal infection is also blamed for the formation of placental infarcts which result from thrombosis of the uterine vessels. Frequent hæmatogenous infections of the kidney by colon bacillus have been noted.

Pathology of every endocrine gland has been suggested as a cause of eclampsia. It is believed by some that the physiological hypertrophy of the thyroid during pregnancy serves to promote the increased liver metabolism made necessary by pregnancy. When the thyroid does not enlarge during pregnancy toxæmia should be anticipated. Kosmak reports a case of profound toxæmia in a thyroidectomized patient. Hypertrophy of the parathyroids has been urged as a cause. On account of its similarity to parturient paresis in cattle a disease which is undoubtedly due to activity of the mammary gland it has been thought by some that eclampsia is due to derangement of the milk forming function of the human breast. Wilson's comparison of the two conditions is striking. Hofbauer and others assert that the convulsions are due mainly to exaggerated activity of the hypophysis cerebri during pregnancy which causes vascular spasms in the brain.

A number of observers were convinced that the cause of eclampsia could be found in incompatibility between the fetal and maternal blood. Further investigation however tends to show that the blood group has no influence. According to Young when interference with the maternal blood supply causes infarcts and partial separation of the placenta autolysis of the placenta liberates toxic substances and toxæmia ensues. Willson and Williamson have pointed out the relationship between premature separation of the placenta and toxæmia. Veit believes that a distinct toxin, syncytotoun, is to be found in the maternal blood.

The effects of fetal toxins and anaphylaxis are believed by many to be the cause of eclampsia. Levi Solal and Tzanck have found in the serum of eclamptics two toxic principles one convulsive the other lethal. They believe that susceptibility

Lawrence explains the effectiveness of these procedures on the ground that morphine gastric lavage and colonic irrigation incite antibody production while delivery and venesection check production and distribution of fetal toxins.

After venesection we employ 10 per cent glucose solution intravenously to the amount of 500 cubic centimeters hoping thereby to aid in the regeneration of damaged liver tissue. The suggestion of Thalheimer that insulin be used to increase carbohydrate metabolism has not yet been carried out. Acidosis is also combated by retention enemata of 6 ounces of glucose and soda 5 per cent solution of each every 4 hours.

We do not induce profuse sweating believing that in doing so we concentrate the toxin in the blood and unduly depress the patient. She is kept warm and usually in a gentle perspiration by means of hot water bags. Veratrum viride is not used. This drug will reduce blood pressure but does nothing toward removing the cause of the disease. Pituitrin is not used in any stage of the treatment.

Unless the second stage of labor is very rapid we hasten delivery after full dilatation of the cervix by forceps or version. Cesarean section is reserved for the primipara with an undilated cervix in the occasional case which does not improve under conservative treatment. Now and then in spite of the treatment outlined above the blood pressure remains high, coma is not lessened and convulsions continue. Then cesarean section is performed if the condition of the cervix will not permit delivery through the vagina. We are convinced that time utilized in procuring elimination and sedation is time well spent and that this preparation increases the likelihood of recovery after the operation.

The series of cases to be reported is too small to be taken as proof of the efficiency of the conservative method of treating eclampsia. It is presented as an addition to the mass of evidence which has accumulated and is simply a record of the work of the past year at Freedmen's Hospital.

Eighteen cases of severe toxæmia were admitted. Three were not having convulsions and were classed as pre eclamptic toxæmia. Two died almost immediately after reaching the hospital before any treatment could be instituted. Remaining are 13 cases of eclampsia which were treated.

In 3 cases cesarean section was performed as soon as possible after admission. All 3 patients died—one 1½ hours, one 2 days and one 3 days after operation—a mortality of 100 per cent.

Of the 10 patients treated conservatively, all lived a mortality of 0 per cent. Two of the 10 were admitted in coma with convulsions, recovered, were discharged and returned later to be delivered of living babies. One patient a primipara was delivered by cesarean section after thorough elimination and sedation.

Fortune is undoubtedly responsible in part for this striking contrast in the results of two methods of treatment. All cesareanized eclamptics do not die and many eclamptics will die in spite of all treatment. Our results however have caused us to be firmly entrenched on the side of conservatism.

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The book is of exceptional interest and should be consulted by physicians and surgeons as well as roentgenologists

DAVID C STRAUSS

THE second volume of this elaborate three volume work on the clinical aspects of malignant tumors fully justifies the good opinion expressed in these columns concerning the first volume. The entire set covers in great detail an enormous field of the greatest practical significance to the surgeon. The various chapters have been written by men who are recognized masters in their specialties and who have brought their respective subjects down to date with many references to the literature of 1924. It is therefore worthy of an important place in the library of every surgeon. The editors and publishers are to be praised for the rapidity with which the several volumes of so compendious a work are being published. Volume I having appeared late in 1924. Volume II in June 1925.

This second volume contains 742 pages with 48 full page colored plates and 267 illustrations which are of exceptional excellence.

The editors P Zweifel and E Payr¹ of Leipzig point out in their introduction that the best proof of the timeliness and the necessity of a clinical presentation of malignant neoplasms is presented by Lubarsch's statistical study covering 86 216 necropsies in 9.8 per cent of which cancer was diagnosed postmortem. The errors in the clinical diagnosis of external cancer amounted to 8.26 per cent of which 5 per cent were mistakes as to the nature of the tumor and 3.26 per cent as to the location. The total errors in diagnosis of tumors of internal organs were 32.44 per cent or almost one third of the total number of diagnoses of these 17.35 per cent were mistakes as to the nature of the tumor and 15.09 per cent errors as to the location of the primary neoplasm. The mistakes in diagnosis of sarcoma of internal organs amounted to 43.23 per cent. That this condition is not peculiar to Germany is evident from Wells' recent review of similar statistics (J Am M Ass 1923 lxxx 737-740).

The editors point out that these discrepancies between clinical diagnosis and postmortem findings persist in spite of the most modern methods employed. Efficient treatment of malignant tumors is only possible on the basis of early diagnosis both as to the nature of the tumor and the organ primarily involved. To furnish criteria for such correct diagnoses is the principal purpose of this work.

The material presented in this volume may be indicated by the following brief summary. The

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article on tumors of the bronchi lungs pleura mediastinum (thymus), heart and pericardium chest wall and diaphragm was written by Franz Krampf and F Sauerbruch that on the esophagus by E Rehn on the abdominal wall by E Sonntag Otto Kleinschmidt wrote the chapter on the pathological anatomy diagnosis symptomatology and differential diagnosis of carcinoma of the stomach Payr that on the treatment of carcinoma of the stomach Victor Schmieden contributed the article on tumors of the intestine and P Clairmont that on tumors of the rectum. Malignant tumors of the liver gall bladder bile ducts pancreas and spleen are discussed by E Heller and malignant tumors of the kidneys renal pelvis ureters and adrenals by H Kuemmel F Voelcker and H Boemunghaus present the malignant tumors of the bladder urethra testicles and epididymis prostate seminal vesicles and penis N Guleke the malignant tumors of the spinal column and P Frangenheim the malignant tumors of the extremities. The volume closes with a chapter by Frangenheim on the relation of tumor formation and trauma. Each chapter is followed by a bibliography in which few references are given to papers by American workers.

The typography and general appearance of the two volumes thus far published are quite in keeping with the very high quality of their contents. Contributors editors and publishers are entitled to high praise for supplying the profession with these works.

L M ZIMMERMAN

A MONOGRAPH² on the subject of malignant disease of the testicle by Dr Daw comprises a complete review of the literature and the author's observations of the study of 40 hitherto unreported cases of the disease. The book is of special interest to pathologists and to clinicians whose specialty may give them access to more than an occasional case.

In the classification of these tumors there are two main types (1) the teratoma in which any one of the three types of cells may become malignant and tend to obscure the presence of the other two and (2) the pure carcinoma which arises from cells of the seminal epithelium.

In the surgical treatment the point is stressed that simple orchidectomy is inadequate in most instances but must be done in conjunction with a complete removal of the lymph chains and node known to be regularly and early involved.

Good anatomical pathological and surgical plates are presented.

HARRY CULVER

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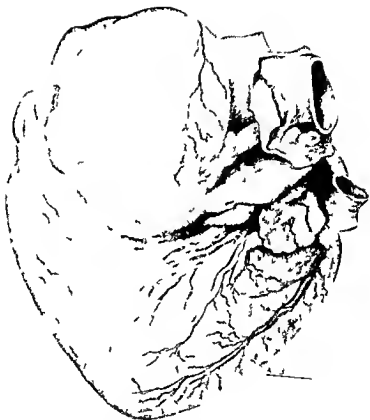


Plate I Hydrotic cyst of the heart in a boy of 9 years

Hydrotic Cysts in Children—H. W. Mills

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

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APRIL 1926

"KEEP THE HOME FIRES BURNING"

WHEN in January the surgeon takes account of stock with regard to the mortality results for the year just past, he is often chagrined over the finding that the percentage of deaths is greater than he had expected. But truth is stranger than fiction and occasionally (because he has been more impressed by his failures than by his successes) further investigation reveals that the results are really better than he had expected.

My brother counsels that when a patient writes a letter of praise it should not be read but that when a letter of the opposite type is received in which our dementis are carefully depicted we should go over it with great care because we would probably learn something.

I have been reviewing our surgical work of last year. The deaths have been divided into three groups. In the first group are the too-lates—cases in which we did our best and in the light of our present knowledge could not do very much better if we had a second chance. In the second group are the cases in which our foresight was thoroughly discredited by

our hindsight. In other words if we had known in advance what we knew afterward some of these deaths might have been avoided. In the third group are the cases in which the general condition was bad but in some of which the patients might have lived if methods of rehabilitation had been carried out before operation.

It is to this problem of rehabilitation before operation in certain types of surgical cases that I have been giving thought. That my keen minded young colleagues have caused me to give thought to this subject and that I have been the agent by which the benefits of their researches have been conveyed to the patient would be the better way to put it.

Life is a matter of combustion—a union of the carbon of food with the oxygen of the air earned from the lungs by the red blood cell. It is only as oxidation takes place that vital processes can be maintained and of these processes the production of bodily heat and autonomic energy is fundamental. A patient can be placed in bed and kept so quiet that the production of energy is reduced to a minimum so far as the 75 per cent under conscious control is concerned but the fires must be kept burning to maintain energy in the vegetative system and to heat the body.

Hill in his classical experiments showed that the glycogen which is produced in the liver and which is merely glucose with one molecule of water abstracted is converted into lactic acid in the muscles of the controllable system at least that the accumulation of this acid in the muscles gives the sense of fatigue and that under violent exercise the lactic acid normally amounting in the

carelessness. The affection is undoubtedly rare up to the age of 4 but markedly increases up to the age of 8. At the age of 3 however 8 cases have been reported by Vegas and Cranwell, 12 by Lagos Garcia 4 by P de Pena and Posadas reported the case of a hydatid cyst in the brain of a child of this age which had caused symptoms for a year.

At the age of 2 hydatid cysts have been reported by Machkowitz (orbit) Cabaut (orbit) Pencic (neck) and Lagos Garcia (liver). Kapsammer had a small patient aged 9 who had passed hydatid cysts in the urine since the age of 6 months (Dévé).

The great majority of early cases can be explained by precocious extra uterine contamination.

In South America where extreme familiarity with the disease renders early diagnosis the rule the frequency in children under 14 years old is well recognized, Vegas and Cranwell giving the incidence as 26.3 per cent and Prat of Uruguay as 23 per cent. It should be stated however that the more recent statistics of Greenway¹ based on 2740 cases showed an incidence of only 11 per cent in children under the age of fourteen and 0.54 per cent for children under the age of four. This drop is probably due to the excellent prophylactic propaganda which has in late years been carried on.

Because the hydatid cyst in the child is a young cyst it is univesicular in over 90 per cent of cases (Dévé, 90 per cent Lagos Garcia 91.6 per cent P de Pena 92 per cent).

Again as a hydatid cyst in man usually remains sterile until it becomes the size of a hen's egg acephalocysts are common in children. Another point to note is that the proportion of suppurating cysts rises with the age of the patient (Dévé 1917). It is twice as frequent in adults as in children the exact figures are 13.8 per cent for adults as against 5.9 per cent in children (Vegas and Cranwell). Lagos Garcia remarks that while suppurating is very rare it is nevertheless the commonest complication in children the lung being the most frequent site. For the same reason because it has not had time to develop secondary abdominal echinococcosis is twice as rare

in children as in adults and thus although hydatid cysts of the liver have a greater tendency to rupture into the abdominal cavity in children than in adults. In this connection it may be mentioned that such rupture in children frequently passes unnoticed for many years.

As regards diagnosis large symptomless liver lesions present an easier problem in children than in adults because such conditions as cancer syphilis and the various forms of cirrhosis can usually be ruled out. There are however exceptions to this statement thus sarcoma of the liver fibrosarcoma of the costal margin gumma of the liver and hepatic hypertrophy of cardiac origin (Morquio) have all been mistaken for hydatid cysts.

Eosinophilia is notoriously inconstant in children and the complement fixation test fails in 10 per cent of cases.

As regards treatment the young simple cyst of the child lends itself more readily to the closed method than does the old and often complicated cyst of the adult. Lagos Garcia advocates it in the absence of perityphlitic suppuration or daughter cysts he practices fixation to the abdominal wall and points out that in suitable cases a cure may be effected in 10 days.

In the case of the lung however the prognosis is as a matter of fact worse than in the adult (Dévé). Hydatid infantism has been described by Dévé who reported five cases in 1920.

Lagos Garcia noted hydatid fremitus in 8 of his cases (7 liver and 1 secondary abdominal cyst). He reported 1 case of hydatid enteric. He noted that miliary tubercles in children may be indistinguishable from pseudotuberculous echinococcosis.

The extreme latency of the disease has been referred to above exact details however in this respect are difficult to arrive at in man and even more so in animals. Generally speaking such cysts grow quicker in children because of the succulence of the latter. Incidentally for the same reason it is much easier experimentally to inoculate young animals than old ones.

In the case of the lung Escudero has pointed out that an hydatid cyst is not likely to attract attention until it has existed for at

ment but be prepared to condemn unheard any modifications of it. In Europe during the same period the situation was quite different because there electrotherapy had remained in the skilled hands of trained experts.

The war and its frightful mutilation of millions of human bodies provided an exceptional opportunity for testing out and demonstrating the usefulness of electrotherapy and physiotherapy. This demonstration made a strong impression on many American physicians who went to Europe to observe the methods employed in treating the wounded and since then a revival of interest in electrotherapy and physiotherapy has been evident. At the present moment, this interest is largely centered on diathermy.

The painful sensations produced by passing an ordinary 60 cycle alternating current through the body are due to its relatively low frequency each alternating impulse being perceived as painful incomplete muscular contractions. If the alternating frequency is sufficiently increased painful contractions no longer take place and the only sensation is one of heat. Diathermy therefore is nothing more nor less than an improved method of employing heat as a therapeutic agent. It provides an almost ideal means of delivering as much heat as may be desired where it is needed. The heat may be diffused over the entire body or it may be concentrated through any region or at any point merely by changing the relative position and size of the opposing electrodes.

When diathermy is used to raise the temperature of some part of the body and the heat is not carried to the point of tissue destruction it is called medical diathermy. "Surgical diathermy implies actual destruction of tissue by concentrating the heat at one point and can be varied within fairly wide limits by means of suitable electrodes.

The scope of medical diathermy will undoubtedly be enlarged but its value in many forms of inflammation without suppuration, such as sprains, simple arthritis and the inflammatory reactions accompanying fractures has been amply demonstrated. The exudates resolve repair is speedier and convalescence shortened. Myositis whether acute or subacute and neuritis respond extremely well. Certain forms of gonorrheal inflammation likewise yield quickly to the treatment. If nothing more could be said of diathermy than that it relieves pain and reduces swelling promptly it would have a permanent place in therapeutics.

In the chronic forms of arthritis the effect of diathermy is not so uniformly striking in many cases partial or complete relief from pain and reduction of swelling are obtained but in others the results are indifferent. If treated early trophic lesions due to vascular changes can sometimes be stopped and much damage prevented. General diathermy (autocondensation) greatly relieves the itching and insomnia associated with jaundice. In essential hypertension the blood pressure can be considerably reduced for several hours but this reduction is transitory. Diathermy has been advocated in pneumonia but it has not been given a serious trial.

The surgical indications depend largely on the expertness of the individual operator and range from keratotic patches warts moles, melanomata and epitheliomata to relatively bulky superficial tumors or such as can be reached from the surface. The advantages of diathermy are that the cosmetic results are better that it can be repeated as often as necessary and that it minimizes hemorrhage and malignant dissemination by causing thrombosis of the blood in the vessels and coagulation of fluids in and around the lesion treated.

Rivarola refers to 21 operative cases of hydatid cysts of the brain in children 8 were cured 13 died a mortality of 61.9 per cent

Uruguay Fournier reported intraspinal hydatid cysts in a boy aged 12. He had sudden paraplegia. X-ray examination showed rarefaction of the fifth dorsal vertebra and of the sixth rib. He was operated upon successfully. This condition may be confounded with primary vertebral osteitis.

Ponce de Leon reported a case of death following lumbar puncture for a hydatid cyst of the brain in a boy aged 11. An enormous hydatid cyst occupied almost all the right parietal and occipital lobes. In the discussion Morquio mentioned a case in which progressive blindness was the only symptom.

R. Gomez recorded the case of an hydatid cyst of the liver with intraperitoneal rupture and dissemination. One year later multivesiculation of the liver cyst (Dévé's defense reaction) was found to obtain and the free edge of the omentum which was adherent to the liver cyst was full of tiny cysts from the size of a grain of sand to that of a hazelnut. It might have been well in this case to wash out the abdominal cavity with ether on the occasion of the rupture of the liver cyst.

Leffort (servic. of Morquio) described an hydatid cyst of the lung cured by vomica in a boy aged 11.

Alice A. Ugón reported the case of an hydatid cyst of the lung cured by spontaneous vomica in a boy aged 6.

L. Morquio published the following cases. Hydatid cyst of the brain in a girl aged 12. Hydatid cyst of the brain in a boy aged 11 operated upon in two stages death the next morning postmortem hydatid cyst the size of a fetal head in the right hemisphere. Hydatid cyst of the brain in a girl aged 13 who died the day after operation. Hydatid cyst of the brain in a girl aged to complement fixation test and Ca on negative no eosinophilia. He points out that in these cases the value of the complement fixation test has been exaggerated. Latency may extend to years. They are usually single. Rarely are daughter cysts found. The size of the cyst may be enormous. Operation is useful in the case of small superficial cysts with central cysts it is usually fatal. In only one of his brain cases (boy aged 6) was operation successful. In a few months he saw seven certain cases and three in which he suspected hydatid cyst of the brain in a few months. He confirms the usual absence of increased eosinophilia in cases of hydatid cysts of the brain. The author quoted three personal cases of hydatid cysts of the neck in children.

Spain A. Martín recorded the case of a retrovesical hydatid cyst in a boy aged 13. Treatment by aspiration of contents through the rectal wall was successful in this as in three other cases.

Corcos reported two cases. One was an alveolar echinococcosis of the liver in a boy aged 8 the first case observed in Spain. The pre-operative diagnosis was multilocular hydatid cyst. The postoperative diagnosis was multiple inoperable hydatid cysts. At

postmortem 2 cysts were found in the liver. Cysts were also found in the spleen, kidney and lung and a subcutaneous one in the left leg. Pathological report echinococcosis alveolaris. The other patient a boy aged 9 had a single small hydatid cyst of the liver with enlargement of the liver and spleen and intense icterus which lasted for 5 years. A tumor could be seen through the abdominal wall. Post-operative diagnosis unilocular hydatid cyst. The author mentions a case in which he mistook a lipoma of the leg for a hydatid cyst on the strength of marked eosinophilia and positive complement fixation test.

Cardenal and Castilla published the report of a case of a hydatid cyst of the brain in a boy aged 14. On decompression over the left Rolandic region multiple hydatid cysts poured out of the opening. The membranes were extracted and the cavity packed with gauze which was all removed by the sixteenth day. Practically complete recovery ensued. Symptoms of epilepsy which had obtained before the operation disappeared. One subsequent convulsion occurred 7 months after operation. The ultimate prognosis is not good in these cases.

Nogueras described hydatid cysts of the neck in two children aged respectively 6 and 12. The latter patient had a primary hydatid cyst of the liver also. The treatment adopted was formolage, evacuation and suture.

De la Mata recorded the case of an hydatid cyst of the sternomastoid in a boy aged 4. Excision cure.

J. Garza del Diestro published the case of an hydatid cyst of the lung in a boy aged 13 whose appearance was tuberculous. He had dyspnea. Eosinophilia was 3 per cent. Complement fixation test was negative. Vomica occurred the night before he was to have been operated upon. Urticaria and pleuritis were noted on the fourteenth day and he spat up hydatid on the sixteenth day. On the twenty-second day eosinophilia 30 per cent obtained and the complement fixation test was positive. Ultimate results were good. Hemoptysis is an important symptom here as it is unusual in infantile tuberculosis. This is an example of spontaneous cure by vomica.

Braú Max Rudolph reported the case of a Portuguese baby aged 4 months with an hydatid cyst of the orbit. An enormous tumor the size of a hen's egg developed in 16 days. The eyeball was intact. The fluid contained succinic acid.

France Braudan recorded the case of an hydatid cyst of the brain in a boy aged 15. The operative mortality in 36 cases collected by the author was 72 per cent.

Verdelot published 3 cases of hydatid cysts in children. The first was that of a girl aged 8 with a paraneuritic hydatid cyst operation cure. The second a Belgian boy aged 10 with a hydatid cyst of the neck operation cure. The third a Belgian boy aged 11 with multiple hydatid cysts of the abdomen. Ablation of 12 cysts was done death occurred from shock 36 hours later.

Pitts reported the case of a girl aged 5 who died suddenly after a fall on her abdomen. Postmortem two hydatid cysts of the liver the size of a tangerine and cricket ball were found one had ruptured into the inferior vena cava. The right auricle and ventricle were filled with hydatid membrane. Death from massive embolism occurred.

Cudmore recorded the case of an hydatid cyst of the liver in a child aged 4 operated on by the Thornton method. The wound healed on the seventh day. On the eighteenth postoperative day the incision was found to be bulging and one ounce of bile stained pus was let out.

Watson stated that he had seen 3 cases of hydatid cysts in children under 4 years of age each of which was as large as a child's head.

British (other than Australia). Colman saw a postmortem case of an hydatid cyst of the spinal cord in a boy aged 10.

Dalton described the case of an hydatid cyst of the liver in a girl aged 12. Hydatidemia was observed also the discharge of daughter cysts via the bronchi. Follow up history at the age of 16 her abdomen was frequently tapped. She was well thereafter for 6 years. At the age of 23 she died from septic peritonitis. Postmortem an old hydatid cyst of the liver was found communicating with the bile ducts and with a dilated bronchus.

Stiles recorded the case of an hydatid cyst of the liver in a boy aged 8 from Sheffland. Operation recovery. He also had a case of hydatid cyst of the liver in a girl aged 9 who came from Sheffland. Symptoms for 3 years. No history of association with dogs. Hydatid fremitus marked. At operation three fourth gallon of clear fluid and one daughter cyst the size of a Bantam's egg were evacuated. Marsupialization and drainage was the treatment adopted. An hydatid rash appeared and lasted for 48 hours. Recovery.

Ashby published the case of an hydatid cyst of the brain in a boy aged 8 who died comatose. Postmortem a large unilocular hydatid cyst in the right frontal lobe was found. Scolices were demonstrated. The first focal symptom (except local pain) was twitching of the face on the same side as the lesion. The cyst bulged externally and compressed the face center of the opposite side.

Marshall described the case of an hydatid cyst of the orbit in a girl aged 5. Operation cyst easily enucleated. No scolices were found. Typical laminated membrane was demonstrated. Complete recovery with normal vision resulted.

Owen (Melbourne) saw a case of hydatid cyst of the spine in a girl aged 13. Laminectomy of sixth seventh and eighth thoracic vertebrae was performed. Daughter cysts were found. The wound was closed without opening the dura.

Cottrell exhibited a specimen of a large hydatid cyst removed from a child from Shetland aged 4 years.

Hogarth reported a case of an hydatid cyst of the liver in a girl aged 12. Daughter cysts obtained.

Marsupialization was the treatment adopted and ultimate recovery occurred though bile escaped for a long time.

Cameron's case was that of a girl aged 10 from Shetland (where the disease is fairly common) with a large suppurating abdominal cyst. Most of the sac was resected and the rest marsupialized.

Walker (South Africa) published the case of an hydatid cyst of the floor of the mouth in a Kaffir female aged 6. It was excised with a part of the submaxillary gland. The cyst contained scolices, hooklets and daughter cysts. Rapid recovery.

Buckley totally enucleated two hydatid cysts from the liver of a girl aged 13. Recovery resulted. Ioasadas practised a similar procedure in 20 cases in patients under the age of 13, the youngest aged 3.

Cornier quoted the case of a pedunculated hydatid cyst of the liver in a girl aged 3. Resection recovery. He remarked that in inflamed liver tissue the stitches hold better than in normal liver tissue.

Lapage operated upon an hydatid cyst of the brain in a boy aged 10. The boy died in 3 weeks from hernia cerebri and meningitis. The case was no postmortem. The pathological report was 'hydatid cyst'.

Gaiger (South Africa) reported the case of an hydatid cyst of the brain in a boy aged 6 in whom enlargement of the head had been noted for 2 years. At postmortem a large cyst was found containing 8 ounces of clear fluid distending the right lateral ventricle. No hooklets but typical laminated cyst wall was found.

Hughes described the case of an hydatid cyst of the liver in a boy aged 21. Operation daughter cysts marsupialization and drainage. Hooklets were demonstrated. The cavity was irrigated with for malin for several weeks when it healed soundly.

Sargent published the case of an hydatid cyst of the brain in a child aged 12. At operation a large hydatid cyst was removed. It reached the surface just behind the left fissure of Rolando. The diameter of the cyst was 6 centimeters and it contained 60 cubic centimeters of fluid. Had postoperative convulsions but showed rapid general improvement.

Jewsbury reported hydatid cysts of the pleura and lung in a boy aged 8. Diagnosis empyema. The left chest was tapped. Clear fluid with scolices being evacuated. The complement fixation test was positive. Eosinophilia 6 per cent. The X-ray demonstrated an hydatid cyst. The boy had always lived in England and had never had intimate relationship with dogs.

Nave (India) described the case of a Mohammedan boy aged 12 with hydatid cysts in both lobes of the liver. Hooklets were demonstrated. Both cysts were treated by marsupialization and drainage. Recovery. Almost complete destruction of the liver obtained.

German, Wohlgemuth reported a case of multiple hydatid cysts of the liver in a girl aged 15. Operation formolage and marsupialization. He notes that in cases of multiple hydatid cysts of the liver

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MASTER SURGEONS OF AMERICA

JOHN THOMPSON HODGEN

JOHN THOMPSON HODGEN was born at Hodgenville La Rue County Kentucky January 29 1826 His father was Jacob Hodgen his mother Frances Park Brown His early education was received in the county school at Pittsfield, Illinois Later he attended Bethany College in West Virginia In March 1848 he graduated from the medical department of the University of the State of Missouri at that time known as McDowell's College He served as assistant resident physician and afterward as resident physician to the St. Louis City Hospital from April, 1848 to June, 1849

He began his work as a teacher in 1849 as demonstrator of anatomy in the Missouri Medical College, was professor of anatomy in 1854 being appointed by Dr. Joseph Nash McDowell and filled this chair until 1858 Subsequently he filled the chairs both of anatomy and physiology from 1858 to 1864

During the Civil War he served as surgeon general of the Western Sanitary Commission, as surgeon of the United States Volunteers from 1861 to 1864 and as surgeon general of the State of Missouri from 1862 to 1864 He was consulting surgeon to the St. Louis City Hospital from 1862 to 1882 and from 1864 until his death in 1882 he taught clinical surgery at the City Hospital

In 1861 he was called to the St. Louis Medical College filling respectively the chairs of physiology and anatomy On the resignation of Dr. Charles A. Pope in 1865 he was made Dean of the College which position he occupied until his death He was honored by the local profession as president of the St. Louis Medical Society in 1872 was chairman of the surgical section of the American Medical Association in 1873, and served as president of the Missouri State Medical Society in 1874 He was one of the original members of the American Surgical Association He was president of the American Medical Association in 1881

He died April 28 1882 after an illness of 2 days of acute peritonitis caused by a pin hole perforation of a small ulcer of the gall bladder

For 33 years Dr. Hodgen was a teacher A keen and accurate observer, his interest was not limited to the sick room He was a student of nature quick to grasp and interpret its laws aright Alert to all the phenomena of life his wonderfully active sympathy with every phase of human nature gave him powers of illustration which fixed facts in the mind of a hearer in a way to make them

AN OPERATION FOR COMPLETE PROLAPSE OF THE RECTUM¹

By URBAN MALES M.D. F.A.C.S. AND JAMES D. RIVES M.D. NEW ORLEANS, LOUISIANA

PROLAPSE of the rectum is usually defined as being any protrusion of the entire circumference of the rectum through the anus while complete prolapse is defined as being such a condition involving all the coats of the bowel. This definition is sufficient for all practical purposes although it does not include what seems to be described invariably as third degree prolapse. Three degrees are differentiated: (1) cases in which the mucous membrane of the anus descends with the prolapse; (2) cases in which the anal canal is not involved; (3) cases in which the inversion begins at or somewhere near the recto sigmoid junction and does not protrude from the anus. Manifestly this last group is not included in our original definition and rightly so since it should be classed as sigmoidorectal intussusception rather than as rectal prolapse. Furthermore the first and second groups would be more accurately described as types rather than as degrees of prolapse since the distinction between them is in kind rather than in degree.

This discussion is limited to complete prolapse of the rectum in adults and more specifically in males since all cases treated by us according to this technique have been in men.

The etiology of rectal procidentia is some what obscure. Normally the rectum is held in position by 3 types of supports. Passive supports the first type include the peritoneal folds reflected from the rectal walls onto the bladder or vagina and the hollow of the sacrum the direct fibrous attachments to the prostate or vagina the sacrum and the coccyx and the lateral ligaments of the rectum which are attached to the pelvic fascia covering the levatores ani. To these may be added the vessels and nerves which supply it although it seems improbable that these play much part since it has been shown that the vessels are so tortuous that if they were straightened without tension, they would permit moderate degrees of prolapse (Todd).

The second group includes the so-called active supports the levatores and the sphincter ani while the third type of support is by conformation and position. The sharp backward angulation of the rectal tube from the prostate (or vagina) to the outlet tends to throw the weight of the pelvic viscera onto the bladder (or uterus) in front and pressure applied vertically closes the anal canal provided the rectum be normally empty. This condition saves strain on the other supports of the rectum just as normal ante flexion of the uterus spares its fibrous and muscular supports.

Prolapse of the rectum obviously cannot occur so long as its active and passive supports are intact. Either they must be weakened by constitutional conditions such as wasting diseases or old age or by prolonged strain or they must be congenitally defective. It is significant we think that although wasting diseases old age and prolonged strain are relatively common conditions procidentia of the rectum is quite infrequent and we are therefore inclined to believe that while they doubtless play some part a congenital defect is usually if not always present.

This defect may take the form of an unusually long mesorectum or mesosigmoid we are not impressed by the effectiveness of peritoneum as a ligament. It may be faulty fascial development a condition known to be definitely present in certain cases as in our first. It may be an abnormally deep cul-de-sac as suggested by Quenu and Moschowitz a condition which prevents the backward angulation of the rectum at the level of the prostate since the bowel is not fixed to the prostatic capsule at all and intra abdominal pressure is applied directly to the anal orifice stretching it instead of closing it as should be the case. Again the anterior rectal wall may be pushed like an obturator through the anus.

It is of course possible that great strain suddenly applied might rupture the structural supports of the rectum but in view of

Clavicle," "Modification of Operation for Lacerated Perineum" "Dislocation of Both Hips," "Two Deaths from Chloroform" "Use of Atropia in the Collapse of Cholera" "Three Cases of Extra Uterine Fecundation," "Skin Grafting" "Nerve Section for Neuralgia," "Report on Antiseptic Surgery" and "Shock and Effects of Compressed Air as Observed in the Building of the Eads Bridge"

Dr Hodgen had a big warm generous nature, well recognized by those who came to know him as he was but these qualities sometimes went unrecognized because of a somewhat reserved even austere manner He was full of a kindly humor His quick perception ready active and all pervading sympathy inspired and made strong friendships The poor and the afflicted looked with confidence to his helping hand The rich and powerful knew that they dealt with a just and humane man The city was rich in his presence He was a refuge in sorrow and sickness His fame as a surgeon was widespread

He made for himself a place unique in the profession No one before him had so clearly obtained first place in the hearts of the people and in the profession The conditions now existing can never evolve a man of such wide and varied capacity But man is for a brief time He was cut off in the prime of life, in the zenith of his fame As a great teacher and a great surgeon he exemplified the genius of humanity whose qualities abide from generation to generation but speak only now and then in the process of time in the individual

He died as he had lived in the harness a friend to humanity He had always wished to go before his usefulness was in any degree impaired Honest frank, direct a great soul We shall not see his like again

H G MUDD

provide support only posteriorly and do not restore either the pelvic floor or the support of conformation so that the forces which aided in producing the original prolapse are permitted to act unchecked. Furthermore a practical objection to Mummery's modification is that the patient must remain in bed 4 weeks and that for 4 months defecation must take place in the recumbent position.

4 Plication wedge shaped excision excision of the mucous membrane and similar methods designed to shorten or narrow the gut (Disfenbach Roberts Delorme Duret etc.) These methods are all obviously of value only in simple cases. In particular resection of the mucous membrane with plication of the other coats has little or no support among English and American surgeons.

5 Plastic restoration of the pelvic supports usually limited to narrowing the external sphincter (Duval Lenormant Lynch etc.) Excision of wedges of the lower rectum are sometimes included in this technique also. The method is effective in mild cases and forms according to Mummery an essential part of any operation for rectal prolapse.

We have found it difficult indeed impossible to form an accurate impression of the relative merits of these various procedures. Few of the authors give statistics of their results and though each seems fairly well satisfied with his own technique the multiplicity of operations and modifications makes it plain that the methods in use still leave much to be desired.

We have developed a plastic operation on the levatores ani and pelvic fascia which is based on the assumption that an abnormally deep cul de sac together with relaxation of the lateral ligaments the levatores ani and the sphincter ani is the cause of complete prolapse of the rectum. The method grew out of the idea that relaxed levatores might easily be corrected by the vaginal route and that at the same time a deep cul de sac might be obliterated and the rectum suspended as in operations for high and extensive rectocele according to the technique advocated by George Gray Ward and others.

It should be noted that since we began our work in 1922 Lynch has reported a method

of plication of the lateral ligaments in front of the rectum which is quite similar in principle to the one devised by us though applicable only to women. We might say too, that while the operation is original with us we have recently learned that a very similar procedure was reported by Duval and Lenormant in 1904. They reported 3 successful cases at that time but we have been unable to find a subsequent report by them and no one else seems to have tried the method. Bickham is the only authority consulted who even mentions it and he gives no bibliographical reference.

DETAILS OF THE AUTHORS PROCEDURE

With the patient in the lithotomy position the prolapse is reduced and an inverted Y incision is made with the arms embracing the anus. This is deepened to expose the external sphincter. The anobulbar raphe is cut across thus freeing the sphincter from the central tendon of the perineum. The anterior quadrant of the external sphincter is now excised and the muscle immediately sutured end to end with U sutures of chromicized gut. The incision is deepened to expose the levator ani. Its medial margins are separated by blunt dissection with scissors. With a finger or a pack in the rectum as a guide the anterior and lateral walls of the rectum as far as the lateral ligaments are exposed. This is best done by blunt dissection with a gauze covered finger. The prostate and seminal vesicles are pushed forward. If the cul de sac is abnormally deep the reflection of peritoneum from rectum to prostate will not be encountered and should be carefully pushed up until the prostate is exposed in front and the adventitia of the rectum as far as the finger will reach behind. The superior surface of the levator ani covered by the pelvic fascia now forms the lateral wall of the space. Beginning at the apex of this artificial vagina sutures are introduced to approximate the levatores and suspend the rectum. Chromicized catgut on full curved round needles is used. A deep bite is taken in the levator and fascia on the right, the needle is then carried down an inch or an inch and a half and several transverse stitches are taken across the lateral and anterior as

We might add that the operation is not difficult that it produces practically no shock and that it is quite practicable with spinal or local anesthesia.

The number of our cases 3 is of course too small to permit of conclusions. We have delayed this report in the hope of adding to their number but without success and we therefore present it now in the hope that others may try the method and demonstrate its merits or its faults.

CASE REPORTS

CASE 1. T F white aged 60 grocer was admitted August 29 1922 complaining of piles, rupture and sore on thigh. The past history was irrelevant except for osteomyelitis of the lower third of the right femur 20 years ago which had never healed. Left inguinal serotal hernia had been present for 8 years piles for 3 years. Physical examination revealed an obese man looking much older than the 60 years he claimed as his age. He appeared quite sick and very feeble. A systolic murmur at the apex of the heart and moderate enlargement were noted. Edema of the feet and dyspnea seemed to indicate failing compensation. There was a large reducible serotal hernia on the left. The rectum protruded 3 or 4 inches and was quite red and edematous. The mucous membrane was gangrenous at the center. Urinalysis showed many casts but no albumin. Other laboratory examinations were negative.

Elevation of the hips and hot moist applications led to subsidence of the edema and separation of the sloughs of mucous membrane. After a week of this treatment the prolapse could be reduced but would not remain so even with the hips elevated. The external sphincter was completely relaxed and the perineum was convex downward instead of concave a condition which suggested the idea of reinforcing the relaxed levatores.

Three months later when the patient had gained sufficient strength to permit of surgical intervention under spinal anesthesia the operation described above was performed except that the rectum was not included in the sutures.

Convalescence was uneventful but the patient's general condition was so poor that he was kept in the hospital until February 24 1923. He was then discharged with instructions to return at intervals for examination. He failed to do this and we have been unable to trace him.

At the time of his discharge a slight mucous membrane prolapse persisted but this first attempt was fairly satisfactory in spite of our failure to suspend the rectum. It was however an incomplete operation and in view of the extreme muscular relaxation of the perineum we strongly suspect that the posterior half of the rectum did not remain in position.

CASE 2. C D colored male aged 29 laborer was admitted September 6 1923 complaining of incontinence of feces and protrusion of rectum. The past history was mainly irrelevant except that the right leg had been amputated because of an injury with infection the previous year. There was no history of constipation. The present illness began 5 years ago with protrusion of the lower bowel during defecation. The first operation was performed the following day which suggests that the prolapse must have been quite extensive as negroes do not ordinarily seek hospital treatment for minor ailments. Within 5 years he had had 3 operations for this condition each time being hospitalized from 2 to 15 months. Two of these operations were said to have been for hemorrhoids the third was definitely a rectal affair but he knew nothing of the details. Incontinence developed after the second operation and the condition had grown steadily worse.

Physical examination revealed the rectum protruding about 3 inches and easily reducible. The anus gaped widely and there was no evidence of sphincter action voluntary or reflex. An irregular scar particularly dense in front surrounded the anus.

Operation was performed September 13 1923 under ether anesthesia. The procedure described was performed without incident except that the density of the scar anteriorly made exposure of the lower margins of the levatores quite difficult. No trace of the external sphincter could be found.

Convalescence was uneventful except for a slight skin infection at the anal margin. The patient was allowed up on the fifteenth day and discharged fit for duty on the thirty third day. At the time of discharge there was not the slightest tendency to prolapse even on straining. Sphincter action was entirely absent but the patient was able to tell when the bowel were ready to move in sufficient time to reach a toilet. If the stool was solid an effort was required to evacuate the rectum. No follow up was obtainable.

CASE 3. G W white male aged 42 clerk was admitted May 7 1924 complaining of piles. The previous history was negative. Piles for 5 years relieved by operation. In March of this year while on a drinking party he suddenly developed a painful protrusion of the rectum which was gradually reducible but would recur at stool and after any exertion. It had grown progressively worse and at the present time was reducible only in the recumbent posture. There was constant soiling of the clothing.

Physical examination revealed nothing except a first degree prolapse of the rectum of about 2 inches and a relaxed sphincter.

Operation as described was performed May 12 1924. Convalescence was uneventful except that after the second day the patient could not be kept in bed and sat up in a chair most of the time. In spite of this the prolapse was entirely corrected when he was discharged on the fourteenth day after operation. Further hospitalization seemed useless as he persisted in defying orders.

REVIEWS OF NEW BOOKS

THE modern tendency to present anatomy in more concise form is again exemplified in a little volume in paper covers which the authors Pouchet and Dupret¹ rightly call a pocket anatomy. Although containing no text whatever the essentials of gross anatomy are very well covered in its 316 pages of simple well drawn pen and ink illustration—many of which are semi-diagrammatic.

One cannot help but regret that the authors did not see fit to use the international or BNA terms in labeling the figures as the French terms used would tend to limit the book's usefulness to that country.

TOM JONES

TURNER'S little book² of seventy five pages with illustrations dealing with cancer surgery presents the substance of a lantern demonstration before the surgical section of the Royal Society of Medicine.

The purpose of the writer is to draw from the wealth of his surgical experience such instances of the operative treatment and cure of cancer in its different situations as will serve to prove the axiom that the most certain and reliable method for the cure of cancer is the well executed surgical excision of the growth together with the path of probable cancer invasion while the disease is still local.

The cases have been observed for periods of from 5 to 16 years after operation and most of them have been supported by re-examination of the pathological material. Although few actual statistics are included the individual case histories are sufficient to accomplish the writer's purpose which is to encourage his younger colleagues to deal with cancer by vigorous and thorough operative measures. R B G

PART IV³ of *Irrtümer der allgemeinen Diagnostik und Therapie sowie deren Verhütung* is now available. The work is divided into four parts. The first part which comprises 221 pages or almost exactly half of the book deals with mistakes and sources of error in roentgenological diagnosis and their prevention. This portion of the work includes some general remarks by Grashey of Munich, a chapter on bone and joint diseases by Grashey, one on the digestive organs by Lorenz of Hamburg, one on lungs, mediastinum and the diaphragm by Lorey of Hamburg, one on the heart and blood vessels by Groedel of Frankfurt, one on the urinary organs by Haensch of Hamburg and one on foreign bodies by Grashey.

The second part 198 pages deals with errors and dangers in roentgentherapy and their prevention.

L A TOMLINSON POORE Victor Fuchet ad S D p t F in G

BOOKS FOR CREDIT EMERSON C E SCHROEDER BY G C Geyler et al
F R C S (Engl) New York William Wood & Co 95

1 TURNER DE LIG. MYNEN DIA. OSTIE END. TH. RA. IN. SOWME
ER 1872 ED. BY Prof Dr J. Schwabbe N. 481
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R. C. Sney Leipzig Geo E. Thieme 1914

This consists of the following chapters: General considerations by Holfelder of Frankfurt, surgical diseases by the same author, gynecological diseases by Reifferscheid and Schugt of Goettingen, skin diseases by Rost of Freiburg, and internal diseases by Salzmann of Bad Kissingen.

The third part 24 pages is a discussion of errors in light therapy contributed by Jesionek and Rothman of Giessen.

The fourth part 21 pages is devoted to errors in radium therapy by Berven of Stockholm.

In the portion dealing with roentgenological diagnosis mistakes in the technique of fluoroscopy as well as errors in the detail of roentgenography with the resulting confusion caused thereby are pointed out. The common errors in interpretation of the normal findings are discussed and the reasons for the mistakes emphasized. The causes of false interpretation of pathological conditions are similarly dealt with. Numerous diagrammatic but entirely satisfactory drawings are used to bring out the points.

The portion dealing with errors and dangers of roentgentherapy is of exceptional interest. Holfelder contributes an unusually valuable 75 pages discussing in considerable detail the poisonous action of roentgen rays, adiosynery, to roentgen rays the latent period of the action of the rays and the time required to determine the dose administered, the dose required, the disadvantage of administering too little and the dangers of excessive dosage, the dosage required for specific tissues, the effect of distance and the absorption in the tissues, filtration methods of measuring dosage, dosage in cross firing and other interesting information. The chapter ends with a consideration of the after treatment. His chapter on errors in roentgentherapy in surgical diseases is likewise of exceptional merit and of great practical value. In this chapter as also in the chapters dealing with gynecological diseases, skin diseases and internal medical diseases, the questions of the indications for value of details of technique of administration and dosage symptoms to be expected and results that may be gained are gone into in the minutest detail so that this portion of the work constitutes a valuable handbook on this subject. The chapters dealing with light therapy and radium therapy are less extensive but contain many valuable practical points.

The work as a whole is highly practical, clear cut and to the point. The usefulness of the book is enhanced by a very good general index and each chapter is preceded by a carefully prepared list of contents. The only criticism of the volume is the absence of a complete bibliography, however this would require too much space to be practical. Holfelder's chapters are the only ones which are followed by a bibliography.

THE TREATMENT OF PELVIC INFECTIONS

WITH AN ANALYSIS OF 1105 CASES

BY THOMAS H. CHERRY, M.D., F.A.C.S., NEW YORK CITY

DURING the past 8 years 40 per cent of the patients admitted to the Gynecological Division of Harlem Hospital, New York City, have had some variety of adnexal infection. There were 1105 cases of adnexal disease and these form the basis for the clinical study herein submitted.

It is not the purpose of this paper to offer anything new in the way of conservative or surgical treatment, but solely to analyze and record the treatment and clinical end results.

These cases can be divided into the gonorrheal and non gonorrheal. In this series of cases of adnexal disease approximately 88 per cent are regarded as gonorrheal in origin, 12 per cent non gonorrheal. In the latter group the condition was due to infections following birth trauma, secondary infections associated with other pelvic pathological changes and in a small number to tuberculosis.

Attempts to classify these groups more accurately by prevailing laboratory methods were unsuccessful. In the presence of urethral and cervical discharges only 12 per cent of smears demonstrated the gonococcus. Cultural methods also proved disappointing. Complement fixation tests from the blood were not only valueless but in some instances were even misleading. Intradermal injections of specific bacterial proteins were tested and seemed devoid of diagnostic significance (3).

As the gonococcus has a predilection for mucous membrane and the site of the primary infection is the urethra or cervix, one can classify adnexal disease as gonorrheal (1) when smears from the urethra or cervix show the presence of gram negative intracellular diplococci (2) when in spite of negative smears there is observed an endocervicitis with a urethritis, skentitis or Bartholinitis, and (3) when there is adnexal infection with infections of the above anatomical sites the smears from which show a preponderance of pus cells.

While these clinical observations are not scientifically accurate criteria for the diagnosis of the etiological factors in genital tract infections, they may be relied upon until more improved biochemical methods have been devised.

Patients having adnexal disease sought admission to the hospital for relief of abdominal pelvic pain. They were usually seen in the acute stage of pelvic inflammation, whether suffering from an initial attack or an exacerbation of a chronic condition. Examination of these patients disclosed the presence of a vaginal discharge either from a concomitant urethritis or endocervical infection. The adnexa were tender and enlarged. The temperature varied from 100 to 104 degrees F.

During this period conservative measures only were applied. Sedatives were given to ameliorate pain, ice bags were applied to the abdomen and hot vaginal douches prescribed to aid nature in the control of the infection. Local treatments were given for the urethritis and endocervicitis. In the event of a suburethral or Bartholin abscess the pus was evacuated by incision and drainage.

Certain groups of these patients were selected at different times to test various forms of the newer therapeutic measures, such as intramuscular injections of milk preparation, normal horse serum and medical diathermy.

The principles upon which the theory of non specific foreign protein therapy is based will not be discussed. A group of 25 patients having acute adnexal infections with readily demonstrable pelvic lesions were given a sterile lactalbumin preparation (Aolan). This was administered by intramuscular injections in 10 cubic centimeter doses as recommended by Heinemann (6). The subsequent temperature, leucocyte counts and clinical symptoms were carefully observed. No general reaction followed in any instance. The leucocyte count showed an increase in 4 patients.

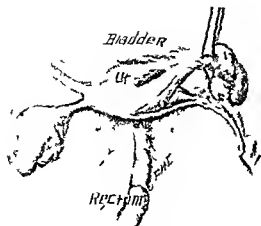


Fig. 3 First step in a fundal hysterectomy with removal of both adnexa

organs will withstand a temperature of 50 degrees C without morphological changes.

In a previous article (1) a report was made of 52 patients with adnexal disease to whom diathermy had been applied. The treatments were administered by means of vaginal or rectal electrodes with an inactive electrode upon the abdomen or sacral region. In some instances a sacro-abdominal application was made. The number of milliampères used varied from 7000 to 3000 but in all cases sufficient current was utilized to raise the vaginal temperature to 43 or 45 degrees C. for 15 to 35 minutes.

Gratifying results followed the immediate cessation of pain being particularly impressive. In 36 patients whose pelvic lesions consisted of tender and painful masses there was complete resolution of the masses in 12 and a marked reduction in size in another 12.

In 16 additional patients, however, the masses were apparently unaffected and not reduced in size although there was a decrease in body temperature and relief of abdominal pain. It is interesting to note that when 8 of these patients were operated upon large pus tubes or tubo-ovarian abscesses were removed more easily than usual adhesions seemed softer more hyperæmic and were easily separated by blunt dissection the masses themselves appeared softer were oedematous and readily delivered without rupture. The inflammatory

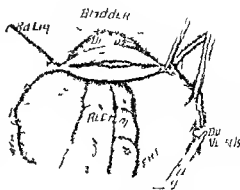


Fig. 4 Drawing showing pelvic structures and fundus of uterus removed

products consisted of a thin watery straw-colored material instead of the thick creamy purulent material usually encountered. All cultures from these masses were sterile. Convalescence in these cases was remarkably smooth all wounds healing by primary union.

In postpartum and postabortion adnexal infections the application of diathermy was not as successful as in those of gonorrhoeal origin. The pain was only temporarily relieved and then recurred. In one case of a fresh post-abortion infection a generalized peritonitis was aggravated and death followed. Another patient having a postpartum infection of the adnexa to whom diathermy was given showed a spreading pelvic peritonitis with abscess formation necessitating evacuation and drainage.

The bacteria most active in postpartum infections are the streptococcus, staphylococcus and colon bacillus. To destroy these microorganisms 58 to 60 degrees C. of heat are essential but since such temperature coagulates tissue the use of diathermy is precluded in most cases of this type of pelvic infection.

Two hundred and eighteen patients having adnexal disease were treated conservatively and not operated upon. After the acute symptoms had subsided the endocervicitis was treated to prevent a re-infection of the adnexa. This consisted of cauterization of the canal in some cases, electro-coagulation in some and the application of dyes in others. The urethra and Skene's ducts were treated by topical

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HYDATID CYSTS IN CHILDREN

WITH REPORT OF THREE CASES

By H. W. MILLS M.R.C.S. (Eng.) L.R.C.P. (Lond.) F.A.C.S. SAN BERNARDINO CALIFORNIA

AS DÉVE has pointed out the seeds of echinococcosis are sown in infancy and it is the extreme latency of the disease which is responsible for the fact that the majority of hydatid cysts cause no symptoms until the patient has attained the age of from 20 to 40 years. To this latency there are of course for mechanical reasons exceptions; thus the average age at which hydatid cysts of the heart have been reported (and all such cases up to now have been autopsy findings) is twenty three. Again hydatid cysts of the brain are seen seven times as often in children as in adults, this situation being third in point of frequency in children as against eighth in adults (the exact figures are 4.3 per cent in children and 0.6 per cent in adults, Déve). The end results of surgery here are relatively inefficacious though Castro had a case well 3 years after operation (Lagos Garcia who quotes four personal cases). The immediate results however so far as life is concerned are surprisingly good as Lendon pointed out as far back as 1903—50 per cent recoveries. For similar reasons i.e. mechanical ones hydatid cysts of the orbit invite an early diagnosis (Solares child aged 6 C. D. Marshall girl aged 5 Cuneo girl aged 5 Machlowzena child aged 2 Cabaut child aged 5 Rudolph 4 months old baby) though even here the extreme latency of the disease is shown in the case of Demichien quoted by Santanowsky

in which the evolution extended over 20 years. Santanowsky also quotes the case of Papaioanon (cited by Demeria) of a boy aged 12 who had had an orbital tumor for 6 years.

Déve has laboured the fact that in children the hydatid cyst is a simple one without complication whereas in adults it is already an old one. Lagos Garcia found daughter cysts in only 23 out of 274 cases in children and such cysts were never found in the lung or kidney. Therefore if one wants to study the disease in its uncomplicated form it is well to do so in a child under 15 years of age, pathology gleaned from adults is here misleading.

Passing over as open to doubt the so called congenital cases (Cruveilhier hydatid cyst of the liver in a 12 days old infant Heyfelder multiple hydatid cysts of the placenta and cord in a 7 months old fetus Hemmer abdominal echinococcosis in a fetus causing dystocia) we come to the possibly authentic cases of Arquellada (abdominal cyst in a 7 months old infant in which the pathologist reported the finding of hooklets) and Rudolph (hydatid cyst of the orbit the size of a hen's egg in a 4 months old baby). Vegas and Cranwell however state that there is no authentic case in a sucking infant.

As a matter of fact it is natural that children should be more likely than adults to contract the disease for the intimacy of children with dogs is notorious as also is their hygienic

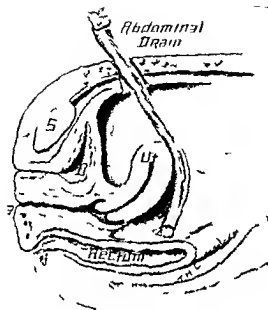


Fig 7 Cigarette drain inserted through lower angle of abdominal wound down to cul-de sac

abscesses or cysts were not uncommon. Infective processes may take place in the ovaries, presenting a simple ovaritis, retention cysts or abscesses.

In this same group there were 800 patients operated upon for tubo-ovarian abscess or cyst, 144 cases pyosalpinx, 386 and thickened adnexa with peritubo-ovarian adhesions, 276. Incidental pathological changes noted were cystic ovary in 118, ovarian cyst in 61, tubal pregnancy in 8, hydrosalpinx in 16, intraligamentous cyst in 1, papillary cyst adenoma of the ovary in 1, ovarian cyst adenocarcinoma in 1, fibromyoma in 85, appendicitis in 83, retrodisplacements of the uterus in 102.

These patients presented clinical evidence of a recurrence of pelvic infection, either acute or subacute. Abdomino-pelvic pain was a pronounced symptom; temperature ranged from 100 to 104 degrees F; leucocyte counts varied from 8,000 to 30,000 depending upon the severity of the infection and the patient's resistance. Practically all had an endocervicitis with a mucopurulent vaginal discharge. Many had urethritis, skenitis and Bartholinitis.

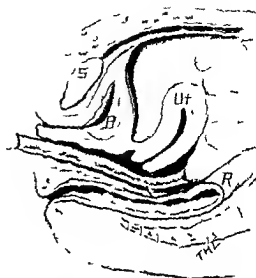


Fig 8 Cigarette drain through vaginal vault into cul de sac

During the acute stage conservative therapeutic measures were instituted until it subsided as shown by normal temperature, pulse rate, lowering of leucocyte count and amelioration of pain.

Early operation has been adopted as a wise policy by the personnel of the Gynecological Department of Harlem Hospital following subsidence of the acute exacerbation. It has been considered safe to operate when the patient's temperature has been normal from 3 to 10 days and the leucocyte count is below 16,000.

In 508 patients operated upon whose record of leucocytosis was below 16,000 there were 1 death or 4.1 per cent mortality. Among 120 patients with a leucocytosis above 16,000 there were 20 deaths or 16.6 per cent mortality. These observations demonstrated the value of the leucocyte count as an indicator of the reaction or acquired immunity of the patient to the pelvic infection.

European Clinics place great dependence upon the sedimentation time of the red blood cells as a more reliable indicator of the activity of infection.

Linzenmeier (8) believes that a sedimentation time of below 30 minutes indicates an

least years. An hydatid cyst grows more quickly for mechanical reasons in the lung than in the liver 76.2 per cent of hydatid cysts in children are situated in the liver.

An Australian surgeon (MacLaurin 1914) has drawn attention to the connection between the incidence of hydatid cysts in man and plentiful rainfalls, the latter occurring about every 6 years. Isolated instances in which it was possible to gauge the latent period have been recorded by Watson 22 years. Cudmore pentoneal cyst 30 years, Philips (Canal Zone) hydatid cyst of the pancreas in a Russian male, probable duration 33 years. I.e. infected at the age of two, Horand (cited by Desplas Boppe and Bertrand) hydatid cyst of the bone, 39 years.

It is not therefore difficult to understand and accept Devel's statement. Echinococcosis is a disease of early life—aye of infancy.

DISTRIBUTION OF ECHINOCOCCOSIS IN CHILDREN

While scattered records of hydatid cysts in children are found in the literature of all nations it is to certain parts of South America that one must go for clinical material on a large scale. The abundance of the latter in Buenos Aires and Montevideo is such that the leading surgeons there are all experts in the matter. And in so far as the disease especially affects children such men as Lagos Garcia de Pena and Morquio are world wide recognized authorities.

From such a wealth of material it is obviously possible in a paper of this kind to select for mention only a few illustrative cases. The following reports from the various countries of the world are with a few exceptions comparatively recent by which I mean that they are subsequent to the only exhaustive review of echinococcosis in this country—that of Lyon published in January 1902.

Argentina. D. S. Cúneo reported 9 cases. 1 of the orbit in a girl aged 5, 1 of the ovary in a girl aged 15 and 7 of the liver in children aged 10 to 15.

Vegas and Jorge published a case of hydatid cyst of the bladder in a boy aged 14, operation recovery.

Lagos Garcia reported a case of multiple hydatid cysts of the liver in a boy aged 6, complement fixation test was positive and eosinophilia 16 per cent.

At a first sitting four cysts were treated by the closed method and a fifth which contained bile was marsupialized. At a second intervention 6 months later five more cysts were dealt with and forty more counted. In 1924 he also reported 2 cases of hydatid cyst of the lung opening into a bronchus in a 7 year old girl. The X ray cleared up the diagnosis (from interlobular pleurisy).

Maddagan published a case of solitary hydatid cyst of the mesentery in a girl aged 4. The site is rare. Vegas and Cranwell's statistics contained two such examples in 419 cases of children aged 3 to 15. Lagos Garcia's thesis (1908) contained none.

Blaksley's case of an hydatid cyst in the inguino-crural region of a girl aged 16 is also of interest because of the rarity of the situation. So also is Garrahan's multivesicular abdominal hydatids simulating bacillary peritonitis in a 10 year old girl.

Zerbino reported two cases of echinococcosis of the lung in children, both of which were cured by spontaneous vomica.

Chueco published a case of an hydatid cyst in the posterior wall of the uterus in a virgin aged 15. The real explanation in such cases is usually secondary peritoneal hydatid cysts which have barged into and become incorporated with the uterus, ovary or prostate. Adla however reports what appears to be an undoubted case of primary hydatid cyst of the uterus in a 15 year old girl.

Vegas on March 17 1923 communicated to me privately the report of a case of a boy aged 9 in whom postmortem was found an hydatid cyst of the heart. Operation was performed on July 23 1905 for thoracic hydatid cyst. The patient died on August 1 1905. Postmortem multiple hydatid cysts of the lung and liver and an hydatid cyst the size of a hen's egg in the right auriculoventricular sulcus were found (see frontispiece).

Dimitri and Taubenschlag reported a case of an hydatid cyst of the brain in a girl aged 12, she remained well for 3 years after the operation but the disease then recurred and she died from meningo-encephalitis following a second two stage operation.

Aguirre's case was that of a girl aged 9 with an hydatid cyst of the kidney for which nephrectomy was done, the condition was discovered accidentally at operation. The pre-operative diagnosis was hydatid cyst of the liver. There was no renal symptomatology.

Navarro and Finochietto's case of multiple hydatid cysts of the liver in a girl aged 9 was notable in that from 80 to 100 cysts were present. The left lobe only was operated upon as it was the least affected. Twenty five cysts of the size of a nut to a hen's egg were treated by the closed method and the patient recovered. The authors regard this as an example of secondary echinococcosis from intra-hepatic rupture of a liver cyst without peritoneal infection.

Munizgurria reports a hydatid cyst of the lung in a boy aged 13, the boy was operated upon successfully by the Lamas Prat Mondino technique.

exacerbations were due either to a fresh infection of another gonococcal strain or a recrudescence of the original one. Occasionally the acute exacerbations were due to the invasion of the field by other pyogenic bacteria which also may persist as a low grade inflammatory process producing great damage to the pelvic organs however in the course of time the resistance of the tissues overcomes these invading germs and an immunity is established. The pus in most instances becomes free of bacteria. It is true that the tissues of the tubal wall may harbor these bacteria as shown by Curtis (4) in tissue cultures but an immunity to this has also been attained and they are usually quiescent and not virulent.

The introduction of a drain into the peritoneal cavity either through the abdominal wound or vaginal vault produces a peritoneal irritation that according to Hertzel (7) surrounds it with adhesions sufficient to exclude it from the peritoneal cavity. At the end of 48 hours these adhesions are fairly firm and the drain has accomplished its purpose in establishing a communication for the escape of infective material therefore on the third post operative day the drain should be gradually withdrawn and shortened and by the seventh day it should be entirely removed. Instances occur when the advisability of establishing drainage is questionable. The old slogan

When in doubt drain might be paraphrased to read 'When in doubt drain but don't drain long. Under these conditions the drain should be removed by the fourth or fifth day. When infection has not taken place the communicating sinus will close more quickly.

In my opinion it is not necessary to drain the pelvis in pus cases when a smear shows the absence of bacteria when the temperature has remained normal for a period of from 3 to 10 days and the leucocyte count is below 16,000.

A guide to the infectivity of pus in the 34 contaminated cases is well illustrated by the mortality of 4 per cent in those patients whose leucocyte count was under 16,000 while a mortality of 20 per cent occurred in those patients whose leucocyte count was above 16,000.

The most logical site for the establishment of drainage in pelvic surgery seems to be through the vaginal vault rather than through the abdominal wound. Occasions frequently arise, however, that necessitate for the sake of speed the latter course. Drains were also inserted for hæmostasis when persistently oozing areas could not be controlled otherwise. Drainage was established 163 times 146 times in the presence of pus contamination and 37 times for bloody oozing.

It is interesting to note that in the contaminated series when no drainage was used the mortality rate was 3.8 per cent and primary union occurred in 79.6 per cent of the cases. When abdominal drainage was instituted the mortality was 14.3 per cent with primary union in 18.3 per cent of the cases. When vaginal drains were inserted the mortality was 10 per cent and primary union occurred in 63.2 per cent of cases.

In the entire series of 578 cases in which drainage was not employed 18 patients died a mortality of 3.1 per cent, of 123 patients with abdominal drainage 19 died a mortality of 15.2 per cent of 38 patients with vaginal drainage 4 died a mortality of 10.1 per cent.

It would seem from these statistics that when pus is encountered in pelvic infections no drainage yields the best results and when the operator decides that drainage is necessary the vaginal route is better than the abdominal.

CONCLUSIONS

1. In 1103 cases of pelvic infections in the Harlem Hospital New York City the gonococcus is the inciting agent in 88 per cent and in 12 per cent the condition is due to other causes.

2. Exclusively conservative treatment of adnexal disease is on the whole unsatisfactory. The patient upon discharge from the hospital is inclined to ignore the advice given urging return visits and reinfection of the adnexa often occurs.

3. Injections of foreign protein in the form of milk preparations (aolan) and horse serum have proved unsatisfactory.

4. The use of diathermy as a conservative measure in the treatment of adnexal disease of gonorrhoeal origin was the most successful of

Adam quoted a postmortem case of echinococcus bavarotrolenne in an idiot boy from Ain who was accustomed to eat slugs frogs etc This was the third case of this rare disease observed in France the first case having been reported by Hayem of Paris in 1869 and the second by Demateis of Genoa in 1890 A fourth case has since been reported by Mallard and Favre of Lyon

Lavillat reported two cases Hydatid cyst of the lung in a girl aged 9 operation recovery Hydatid cyst of the lung in a boy aged 10 spontaneous cure by vomica

Bertrand and Medacovitch published the post mortem case of a hydatid cyst of the brain in a boy aged 15 Practically the whole of the left cerebral hemisphere was destroyed

Rocher and Masse recorded the case of an hydatid cyst of the liver in a boy aged 7 The complement fixation test was negative and eosinophilia not increased He was operated on by the closed method and rapid recovery resulted

Nove Josseland reported the case of an hydatid cyst of the iliac bone in a girl aged 13½ The picture suggested cystic osteosarcoma Operation death

Italy Chelini published the case of a baby aged 5 with an hydatid cyst of the right lung Operation consisted of cutaneous incision of Schede resection of 4 centimeters of seventh and eighth ribs incision of pleura and suture of parietal to visceral layers pneumotomy with cautery evacuation of cyst contents The wound healed on the twenty eighth day

Longo recorded the case of an echinococcus cyst of the kidney in a girl aged 7 The tumor was the size of a child's head Eosinophilia 60 per cent Marasmus for 5 months but no urinary symptoms At operation the contents including one daughter cyst were removed and the cavity packed with gauze Fever for 20 days Good recovery

Fioravanti saw three cases The first was that of a child aged 3 with an echinococcus cyst of the left lobe of the liver Marsupialization was done and child discharged in 50 days In the second case an hydatid cyst of the mesentery in a boy aged 14 an incision was made and foetid pus containing daughter cysts evacuated the cavity was packed with iodoform gauze and patient was discharged cured in 2 months The third case a child aged 3 had a hydatid cyst of the transverse mesocolon which contained daughter cysts Marsupialization was done and child discharged cured in 45 days

Iavarone recorded the case of an echinococcus cyst of the liver in a boy aged 6 he was operated upon and cured

In Lama's case the X ray demonstrated typical hydatid cyst in the left lung of a boy who had been ill for 6 months Ca on positive Operation resulted in recovery

Baccarini described an hydatid cyst the size of a hen's egg in the left side of the neck in a boy aged 10 Hooklets were demonstrated Out of 116 cases of hydatid disease in children in the services of Morquio and de Pena only 2 were found in the neck

Genoese published the case of a girl aged 7 with hydatid cysts in both lungs Biological tests all failed but the X ray cleared up the diagnosis Cysts in one lung were successfully operated on those in the other lung were left for a future occasion In Thorstensen's 920 cases in Iceland only 4 were in children aged from 4 to 10

Sabatini's case was that of a boy aged 14 with an hydatid cyst of the brain which ruptured into the longitudinal sinus Severe anaphylaxis urticaria cyanosis dyspnea collapse death

Australia The prevalence here of the disease can be judged by the size of the personal statistics thus Barnett reported 302 personal cases MacLaurin had had up to 1907 140 personal cases of hydatid cysts of the liver he mentioned that 70 cases were operated on in Sydney in 2 years and that the disease was uncommon until 20 years before K D Fauley stated that from 1908 to 1921 258 verified cases were admitted to the Melbourne Hospital O'Hara referred to several hundred personal cases but thinks that the disease is less prevalent in Victoria than it was 30 years ago The list of cases here selected must necessarily be brief

Ritchie recorded 2 cases in children The first was that of an hydatid cyst of the lung in a boy aged 11 operation cure In the second an hydatid cyst of the liver in a girl aged 7 had been removed in 1899 subsequently cysts in the right buttock and below the left costal arch appeared the cyst in the buttock disappeared after traumatic rupture

Joske described the case of an hydatid cyst at the apex of the left scapula in a boy aged 9 The cyst was suppurating and contained daughter cysts and fragments of bone The tip of the scapula was necrotic and two contiguous ribs were fractured This was the only case the author had seen of fracture of the rib from hydatid disease

Anderson published the case of an hydatid cyst of the lung in a girl aged 7 Operation the cyst contained foetid pus and communicated with the bronchi There were no daughter cysts Recovery resulted

Verco and Poulton reported hydatid cysts of the brain and heart in a boy aged 14 The brain cyst was operated upon in two stages The temperature rose to 105 degrees F on the seventh day and death occurred on the fifteenth day Postmortem two other cysts were found in the brain and one in the heart

J Ramsay saw over 100 cases of hydatid disease in Tasmania in 17 years He quoted the case of an hydatid cyst of the liver in a girl aged 4 The common duct was blocked by daughter cysts

Ryan described an hydatid cyst of the brain in a girl aged 6½ A tympanic note on percussion of skull was noted Operation was done in two stages The cyst occupied a large part of the left cerebral hemisphere The bone was not replaced A small rubber drain was inserted Recovery occurred Eleven weeks after operation the optic neuritis had disappeared and speech was almost normal there was still some right foot drop

RESULTS OF HYPOGLOSSOFACIAL ANASTOMOSIS FOR FACIAL PARALYSIS IN TWO CASES¹

BY ALFRED BROWN, M.D. OMAHA, NEBRASKA

THE operation of anastomosis between hypoglossal and facial nerves for the relief of facial paralysis was first performed by Koerte (5) in 1901 and described by him in 1903. Since that time reports have appeared sporadically in the literature but the operation does not seem to have received the attention that its results would merit. From the standpoint of physiology the procedure appears to be the one that would offer the best results, as aside from the restoration of nerve continuity the question of restoration of psychic control must be considered. Fra-

zier and Spiller (2) divide the desiderata in facial nerve recovery into three main classes: First the restoration of normal contour to the face during rest; second the restoration of voluntary motion in the muscles; and the third the restoration of emotional expression. The third division is the result mostly to be sought for and because of the close relation between the cortical centers of the hypoglossal and facial nerves as illustrated by Gibson (3) an anastomosis between facial and hypoglossal nerves would seem to offer the best therapeutic results. (See Figs. 1, 2 and 3.)

The operation itself though slow and tedious is not particularly difficult if the anatomy of the parts is kept in mind, especially the fact that the facial nerve is situated deeply at least an inch beneath the skin. The best guide to the facial as noted by Coleman (1) is the small branch which it gives off to the posterior belly of the digastric muscle. Division of the tip of the mastoid process to turn back the anterior margin of the sternomastoid muscle as suggested by Halstead (4) is not always necessary and was not done in the first of the two cases. The hypoglossal nerve can be brought up to the facial with less tension by passing it in front of the digastric (see Figs. 4 and 5) rather than behind it as shown by Gibson. In both of these cases the descendens hypoglossi was divided and its central end sutured to the peripheral end of the divided hypoglossal (see Fig. 6). The result in each case could be classified as fair only. The paralysis of the tongue was not a particularly serious matter and a certain amount of this paralysis still remains.

The regeneration of nerve to the tongue does not seem to compare with that of the facial nerve.

The operation itself is only the beginning of the treatment and this fact must be impressed on the patient in such a way as to avoid any subsequent disappointment that results are

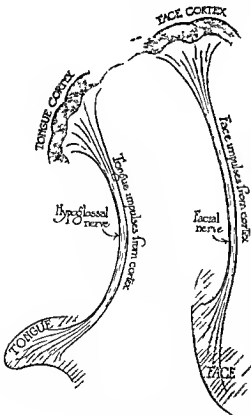


Fig. 1. Normal path of facial and lingual cortical impulses. (After Gibson.)

seldom more than three obtain and that their origin is usually due to dissemination of the component parts of the primary cyst

Holland De Jager reported the case of an echinococcus cyst of the lung and liver in a child aged 4 both cysts were removed at operation

Verschuur saw a case of an hydatid cyst of the lung in a child Eosinophilia 20 per cent hooklets in sputum complement fixation test positive X-ray demonstrated an hydatid cyst in each lung There was no history of association with dogs

Scott Ireland Curthod quoted the case of a boy aged 15 who had twice been operated on by Roux for peritoneal echinococcosis and who died from generalization of the disease He also mentioned the case of Kolbe that of a boy aged 7 with a suppurating hydatid cyst of the liver Many necrotic daughter cysts were encountered Operation marsupialization

HYDATID CYSTS IN CHILDREN IN NORTH AMERICA

Lyon's review of the subject (up to July 1 1901) contained 5 cases of hydatid disease in children (Case 2 boy aged 10 abdominal hydatidenteric Case 95 girl aged 12 brain Case 103 Icelandic girl aged 10 five cysts in the liver Case 129 child with many cysts in its bladder, hooklets demonstrated Case 146 Italian boy aged 7 two large cysts of the liver containing daughter cysts) In a footnote (p 131) he stated that Ferguson saw 3 cases in children under 8 years of age who had been brought to Winnipeg by Icelandic immigrants This makes 8 cases in all for North America

Since the publication of Lyon's paper three more case reports have appeared

CASE 1 CHENEY Italian boy aged 7 hydatid cyst of the liver two stage operation recovery

CASE 2 CHENEY An Italian boy aged 10 born in Argentina where he was intimate with dogs had a hydatid cyst of the liver no daughter cysts Recovery fistula healed very slowly

CASE 3 H. M. YOUNG (Canada) Girl aged 9 came to Canada at the age of 2 from Southern Russia where she had contracted the disease An hydatid cyst of the right lobe of the liver the size of a grapefruit and one in the quadrate lobe the size of an orange were found The cysts were evacuated and packed with gauze Both contained daughter cysts Hooklets were demonstrated

To these I now add three cases which have not been previously reported

CASE 1 (Courtesy of Dr Emmet Rixford of San Francisco 1897) Hydatid cyst of the liver in a boy age 16 He had had fever four years before

and enlargement of the right side of the abdomen for 3½ years At operation April 11 1897 an hydatid cyst of the liver containing one pint of fluid was found Marsupialization was done Three days later many daughter cysts discharged with membranes Recovery A second cyst was discovered evacuated and drained recovery June 7 1897 patient discharged with wound soundly healed

This case was not included in Lyon's list

CASE 2 (Courtesy of Dr Norman F Sprague of Los Angeles) Boy aged 13 born in Scotland had lived 10 years in America At first operation in 1920 multiple cysts of omentum were resected

At second operation multiple cysts of liver were resected *en masse*

At third operation recurrences in pelvis were resected

The result was an apparent ultimate cure Patient is now quite well and working with no evidence of recurrence In this case hooklets were demonstrated there was no eosinophilia

CASE 3 (Courtesy of Dr Hugh K Berkeley of Los Angeles) Russian boy aged 7 who had lived all his life in Los Angeles At operation (1923) a unilocular hydatid cyst of the liver the size of a baseball containing 6 ounces of fluid was found The treatment adopted was marsupialization and drainage Typical laminated membrane and scolices were demonstrated The patient recovered

Thus the total number of cases of hydatid cysts in children for North America to date is only 14

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Fig. 4 Wound laid open. Facial hypoglossal and descending hypoglossal located and dissected clear.



Fig. 6 The descending hypoglossal has been divided and its proximal stump sutured to the cut end of the distal stump of the hypoglossal. This was done in 2 cases with only a fair degree of success.



Fig. 5 Facial and hypoglossal nerves have been divided. The posterior belly of the digastric muscle is retracted and the hypoglossal nerve drawn upward and sutured to the facial.

time complete paralysis has developed and is now present. Four days ago a small sequestrum was removed from the mastoid and on examination proved to be non-malignant.

The physical examination was negative except for the wound in the region of the middle ear and mastoid which was partially healed and the facial paralysis which was absolute. There was no motion of



Fig. 8 Photograph of same patient as shown in Figures 7 and 8 September 15, 1945, 15 days after operation.

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Fig 11 Case in almt 100 Mch 1924 h in face in repose ptt nt attempt to close eyes trying to whistle and attempting to sh w teeth

any of the muscles of the affected side and in addition the reaction of degeneration was present. The peculiar apparent lengthening of the affected side which is characteristic of long standing cases of facial paralysis was marked (see Fig 7). Though the patient was unable to close the eyelids voluntarily it was interesting to note that they closed completely during sleep. The eye itself was normal except for a peculiar staring look and some excess lachrymation. The patient has been very careful of the care of the eye and thus has escaped any disagreeable symptoms.

In spite of the long duration of the paralysis an operation was performed on March 12 1924 and an anastomosis between the proximal end of the hypoglossal and the distal end of the facial nerves was made using very fine silk sutures which passed through the sheath of the nerve only. An anastomosis was also made between the proximal stump of the descendens hypoglossi and the distal stump of the hypoglossal nerves. Because of the thickening of the tissues due to the radium the dissection was somewhat difficult. Postoperative recovery was uneventful except for a complaint of swelling of the left side of the throat and soft palate which lasted for a few days. The wound healed by primary union and the patient left the hospital in 10 days. The paralysis of the tongue proved a little troublesome in eating for a few weeks but is at present not noticeable.

Massage and faradic electricity were begun and the patient returned home to Texas after being instructed in the technique of their use. In June she writes: "On about May 4 I began to notice a deep pulsation of the nerve when I used the battery. This gradually increased and on May 25 I noticed an outward pulsation near the ear. Since then this pulsation has continued when the battery is used. The left side seems less tense and tight than it did. The first voluntary motion occurred when she tried to move her tongue against her teeth and from that time on improvement has been continuous (see Figs. 8 and 9).

The last photographs were taken on August 12 1925 (Fig 10) 17 months after operation, and a month later she writes: "Mr B says there is a slow gradual improvement in the movement of my mouth. I can feel that the lower left corner feels less tight."

CASE 2 Miss W W age 19 years was referred by Dr W F Callias on March 14 1925 (see Fig 17). She gave a history of having had a running ear on the left side for 13 years. In September 1923 she began taking treatments for this but without benefit. In February 1924 she was operated upon for left mastoid disease. Two days after the operation she noticed weakness of the left side of her face which increased to complete paralysis and there has been no return of function. Physical examination is negative except for a completely healed mastoid wound and the facial condition. There is complete paralysis of the muscles controlled by that portion of the facial nerve which supplies the lips and the lower part of the face. There appears to be slight motion of the eyelids on the left side but no motion of the left side of the forehead.

At operation on March 16 1925 a double nerve anastomosis was performed. The technique was essentially the same as that used in the previous case except that the tip of the mastoid process was chiseled through and turned back in order to give sufficient exposure. The facial nerve did not seem appreciably changed either in form or consistency although it appeared to be a little smaller than the normal. On stimulation of the nerve there is a slight response in the muscles of the eyelids but the remainder of the face continues to be completely motionless.

Convalescence was uneventful and the wound healed by primary union. Ten days after operation she was permitted to return home after being instructed in the use of massage and electricity. April 13 the tongue is recovering. She eats and talks better. There is no motion of the face. May 25 there appears to be slight motion returning in the lower lip. The eyelids close better. June 22 a letter says: "I am beginning to notice a change in my face. For

the difficulty experienced in delivering this organ through the perineum for resection it is probable that such a catastrophe would be accompanied by pain comparable to that experienced in delivering the fetal head and it is not recorded that sudden prolapse causes such agony. It is also true that extensive perineal lacerations are sometimes followed by prolapse of the rectum but they are even more frequently followed by prolapse of the uterus and we believe that few gynecologists hold that such lacerations alone produce this condition.

Numerous exciting causes may obviously be added such as constipation prolonged sitting at stool faulty position at stool prolonged diarrhoea with tenesmus heavy lifting and stricture of the rectum or the urethra but all are so common that it is impossible to assign to them more than a minor part in the production of rectal prolapse. It is probable that polypoid tumors and high strictures may lead to the formation of sigmoidorectal intussusception and that this condition may in turn be converted gradually into a first or second degree rectal prolapse but such cases are very infrequent.

Whatever be the cause of the condition however we have in the end to deal with an anatomical defect as in hernia and any method of treatment must be directed toward correction of the more or less mechanical deficiency. We are not of course considering such small protrusions as may be cured by non operative measures.

THE OPERATIVE PROCEDURES IN USE

Innumerable operations have been devised for the cure of rectal prolapse none of which has proved entirely satisfactory. To mention them briefly they include

1. Excision of the offending organ either totally or in part (Mikulicz Cunningham). This method seems to have fallen gradually into disfavor. It is an illogical procedure at best since none of the supports are restored and since further prolapse is inhibited only by the mesosigmoid. The normal motor mechanism of the rectal pouch is of course entirely destroyed wound infection gangrene of the gut and peritonitis are not uncommon sequelae.

and recurrence is estimated to be as high as 54 per cent so that the technique on the face of it has little to commend it.

2. Suspension of the bowel within the abdomen with or without obliteration of the cul de sac (Moschcowitz). This method also has few advocates which is not surprising in view of the decidedly indifferent results obtained by a similar technique in suspension of the uterus or the stomach. It must be pointed out however that the simultaneous obliteration of the cul de sac and the suspension of the rectum by pursestring sutures beginning at the depths of the pouch has much to recommend it. As advocated by Quenu and Moschcowitz it has the virtue of restoring the anterior fixation of the lower rectum and preventing the direct action of intra abdominal pressure on the abnormally mobile bowel. Moschcowitz adds that relaxation of the sphincter and prolapse of the mucous membrane may require additional treatment. This operation is plainly based on the theory that an abnormally deep cul de sac is the primary cause of the prolapse which begins as a hernia of the anterior wall of the rectum through the anus. In our opinion this theory accounts for some instances of this condition and possibly for all of them and this being the case the method is a sound one but it is open to serious practical objections. In the first place it is a severe and difficult operation not suited to debilitated or aged patients and in the second place while it is a reasonably simple procedure in women it is a very difficult one in men and necessitates suture of the rectum to the bladder a dangerous and illogical performance.

3. Fixation of the rectum to the sacrum and coccyx (Tuttle Sick Mummery). This procedure usually combined with shortening of the external sphincter is rather generally favored. Tuttle's method of scarification and suture seems rather the more popular technique but Mummery reports great success with a modification of Sick's method. This consists in dissecting the organ free from the sacrum and packing the space until it is obliterated by granulation tissue. The result is a firm scar which re-establishes one of the normal supports. These methods however

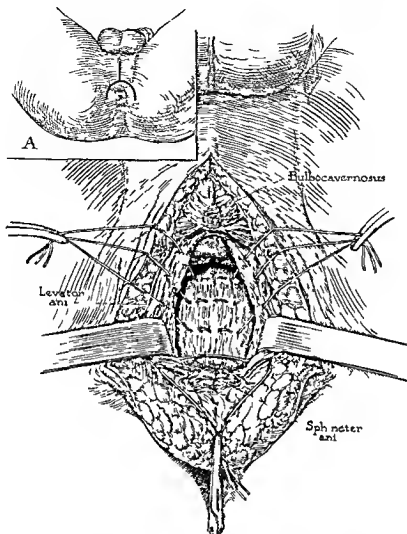


Fig 1 The anatomy of the operative field and the method of applying the sutures

pects of the rectal walls. From this point the needle is carried up to a point on the left levator corresponding to the first bite on the right and a similar stitch is taken here. Three or 4 sutures of the same type are inserted at short intervals until the free margins of the levatores are reached. Each of these sutures when tied approximates the levatores and suspends and plicates the rectum and closes the depth of the cul de sac. A last suture approximates the free margins of the levatores but does not pick up the rectum. This permits the anus to be thrown backward re-

producing the normal backward angulation of the anal canal. The effectiveness of this feature is illustrated in Case 2 in which although the sphincter was absent a fair degree of control of solid faeces was obtained.

When relaxation of the pelvic floor is extreme it may be necessary to supplement this procedure by fixing the posterior wall of the rectum according to the method of Tuttle. Mucous membrane prolapse may mar an otherwise perfect result as in our third case but this may be easily corrected by linear cauterization or excision.

sion measured approximately 2 5 millimeters. The entire area of depression of bone about 2 5 square inches in extent was covered by a sanguineous cyst which when filled projected for approximately 3 millimeters but when empty permitted of free palpation of the bone and of recognition of the defective formation of its outer table. Turgescence of the cyst was increased by all factors which induced congestion such as crying coughing inclination of the head compression of the jugular veins, et cetera. With the child in the usual position no fluid was observed in the region of the depression.

In the second case the patient a man of twenty exhibited above the left eye a congenital tumor treatment of which by physicians consulted by his parents immediately following his birth had proved ineffectual. The tumor which according to his statement presented comparatively the same dimensions as in early childhood extended from the glabella for a distance of 2 inches toward the left and from the arcus superciliaris for a space of 3 millimeters above the beginning of the growth of hair. It involved an area of approximately 4 square inches and when filled projected about 1 inch beyond the surface of the forehead. This occurred only on exertion when the patient stooped coughed or sneezed or following compression of the jugular veins under the influence of heat and as a result of all factors which impelled the blood towards the head or impeded its return. Near the outer extremity of the arcus superciliaris was felt through the emptied tumor a depression in the frontal bone which suggested loss of substance of the bone and at the same point an area where apparently a moderately large foramen existed. The patient experienced no discomfort except when he wore a heavy head covering or overexerted himself where upon vertigo and a sensation as of rupture of the distended tumor ensued. Color of the skin remained unaltered even when the tumor was filled. The latter was readily evacuated by pressure and under the influence of the factors referred to above became filled within 30 seconds in which condition it appeared sharply defined and entirely symmetrical.

In the opinion of Stromeyer the above described phenomena indicated clearly that in these cases filling of the sac with venous blood occurred and that a portion of the external table of the frontal bone was lacking.

An attempt to remove or otherwise to treat the tumor was regarded as useless and dangerous and was therefore not made.

It is obvious that Stromeyer recognized that the conditions described by him could result from congenital anomalies or follow trauma.

Confusion still exists in regard to the type of case which Stromeyer included in

his original description. This may be observed from the following quotations.

Achilles Mueller Stromeyer drew his conception of the disease picture from a case of Hecker and from two cases with which he himself worked in which as a result of a trauma a vein was torn at its point of departure from the emissarium. The blood from it flowed under the periosteum and since the vessel could not retract itself within its rigid bony canal the bleeding was not arrested. The wall which surrounds the outpouring of blood will gradually become clothed with connective tissue the cavity thus created remained permanently enclosed in the circulation and in permanent connection with the veins of the skull. There are a large number of cases which certainly cannot be cleared up by the explanation given by Stromeyer but which must be referred to congenital or perhaps even acquired vascular anomalies.

Borchard in 1916 reiterated the conception of the pathology of sinus pericranii attributed by Mueller to Stromeyer.

As late as 1924 Sudhoff did not realize that Stromeyer included the congenital type of tumor in his original description as is evidenced by the following: 'Many conditions are designated as sinus pericranii which do not have the exact picture described by Stromeyer. He means by it only a subperiosteal hematoma on the skull which occurs through the tearing of a vein by its protrusion through an opening. This condition then always requires trauma as a causal agency.'

In 1851 Dufour without knowledge of Stromeyer's contribution reported the following case under the title of 'New Variety of Blood Tumor.'

After careful consideration of all of the then available classifications of tumors of the vault of the cranium he proposed the term osteovascular fistula. None of the reports are more elaborate in detail therefore a full abstract is appended. Particular attention is directed to the autopsy findings.

Dufour's case. In 1799 during an assault on a fortification he was struck on the right lateral portion of the forehead about 3 centimeters from the

He was re-admitted for examination 6 months afterward. A slight eversion of mucous membrane was present, not more than a quarter of an inch, but there was no evidence of prolapse and the sphincter control was normal. In May of this year he was examined at the office at which time there was a mucous prolapse of about an inch which was quite oedematous. The rectal wall was firmly fixed. November 19, 1925, he returned complaining of a recurrence of the original condition. Careful examination showed that the posterior semicircle of the rectum had prolapsed about an inch (not nearly so much as originally) and that the anterior portion was so firmly fixed in position that the gauze covered fin er could not produce eversion of even the mucous membrane. Posterior fixation will be done later and we believe should be done in every case, no matter what the type of prolapse.

In addition to these cases we are able to add one more, a woman, through the courtesy of Dr. J. de J. Pemberton of the Mayo Clinic. The operation was done at the suggestion of one of us (Maes) and the report 5 months after operation is that the results are perfect. Posterior fixation was done in this instance.

It will be readily seen that this operation has evolved gradually and that the results have not been ideal. We believe, however,

that we have discovered and corrected its weaknesses and that as it stands today it offers a satisfactory technique for all cases of rectal prolapse in which complications do not exist and in which the condition is not extreme.

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of the vault of the cranium by communication of the meningeal vessels with the external skin by means of an opening in the bone"

In 1869 Wislicenus, in his inaugural dissertation Zurich presented two cases which came under his observation, and he collected from the literature 26 cases. The cases of Wislicenus are as follows

CASE 1 A boy of 11 years with negative family and personal history presented a congenital tumor upon the forehead which at first completely covered the left eye but shortly after birth diminished in size and left the eye free. Fourteen days later however the tumor assumed the size which it exhibited at the time patient was admitted to hospital. During attacks of laryngitis from which the patient suffered frequently the tumor swelled became tense and the skin over it appeared bluish. There were no pains headache or vertigo. The tumor caused no disturbances even when filled with blood and it disappeared readily on pressure. It involved the entire height of the forehead and extended from the upper margin of the orbit to the hair line beyond which it penetrated for a short distance so that its upper portion was covered with hair. The tumor extended horizontally from the median line of the forehead to the anterior border of the temporal fossa its horizontal diameter measuring 6.5 centimeters its vertical diameter 5 centimeters its height 2.5 centimeters and its circumference at the base 19 centimeters. A shallow furrow divided it into two parts.

When the patient wrinkled the forehead the tumor appeared to be located below the frontal muscle and appeared to pulsate synchronously with the radial pulse. Palpation revealed fluctuation and a tumor of soft consistency. On more careful palpation it was found that at several points the tumor was composed of small irregular bodies with smooth surfaces. Its base was irregularly humped and between the humps there were irregular depressions in the form of fissures. The tumor increased in size with all activities which caused rushing of blood to the head as stooping coughing pressure and compression of the jugular veins. Compression of the carotids exerted no influence upon the extent or degree of filling or pulsation of the tumor. Circular compression had no influence upon the size of the tumor therefore involvement of the branch of the temporal vein did not exist. This was evidenced also by the fact that pressure upon the tumor did not cause distention of the branch. A direct communication between the tumor and the dural sinus was here assumed and from observations it was inferred that the communication was effected by means of a lumen of considerable size since the contents of the tumor were evacuated in so short a time. It was believed highly probable that the tumor communicated with the superior longitudinal sinus.

CASE 2 A female factory worker aged 15 when a child 35 weeks old had fallen downstairs. She was picked up unconscious and for several days had remained in a stuporous condition. Examination revealed upon the occiput over the region of the scar a markedly prominent tumor and a fissure in the bone which corresponded in length and direction with the injury inflicted by the fall. The case was diagnosed at that time as fracture of the cranial bones and the death of the child was predicted. The skin above the tumor was incised and a quantity of dark blood was evacuated. The child was treated in the hospital and subsequently recovered but later on had a violent convulsion which continued for 5 hours. The mother stated that the edges of the fracture then became more and more separated.

When seen by the author the patient complained only of frequent headaches particularly after stooping but had never suffered from vertigo or from pains in the region of the tumor. General examination of the patient was negative. A moderately extensive area of pulsation almost entirely covered by hair was noted upon the posterior portion of the left parietal bone and the left half of the occipital bone. This area was 10.5 by 3.5 centimeters. Pulsation was most marked in the lower posterior portion and was somewhat less evident in the upper anterior portion. The overlying skin was of normal color and was thickly covered with hair. Palpation revealed a deficiency of bone over the entire area of pulsation. Here the outer table of bone appeared to be absent. The entire area of depression was divided into six fields by five transverse ridges of bone. No abnormally distended vessels either veins or arteries were found in the region of the tumor. Pulsation was visible as well as palpable. There was marked fluctuation. The contents of the tumor were readily evacuated by pressure. No vertigo headache or convulsions. There was no discomfort due to the tumor. Filling was least evident with the head in the erect position. Bowing stooping coughing and pressure caused filling of the tumor which upon cessation of such activities resumed its natural size. Compression of the left carotid caused the tumor to diminish in size and pulsation to become weaker while compression of the right carotid exerted no influence either upon size or pulsation. Compression of the right jugular produced marked swelling of the tumor and compression of the left jugular vein produced only slight swelling. This varying influence of both jugular veins led to the assumption of the existence of an abnormality of the sinus of the dura mater.

This author carefully considered all the points of difference expressed in the literature with regard to the condition. He expressed preference for the name sinus ptericranii because 'it can only mean the pathological form as there is no sinus on the outside of a normal cranium.'

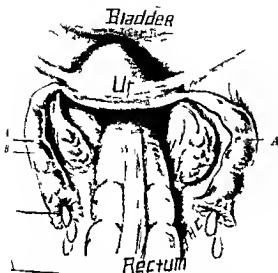


Fig 1 Showing an initial gonorrhoeal salpingitis. *A* Inflamed tubes *B* ovaries *C* imbricated end from which purulent material is exuding

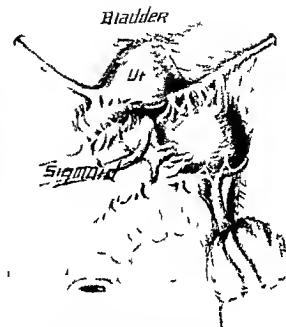


Fig 2 Illustrating complicated lesion following recurrent attacks of pelvic inflammation

the lowest 4 000 and the highest 7 000 12 hours later. The other 21 patients showed either no increase or a slight reduction in the existing leucocytosis.

In no case treated with this preparation was there any relief of pain, reduction of the pelvic inflammation, or diminution of the vaginal discharge.

Foreign protein in the form of normal horse serum was administered to another group of 15 patients with similar pathology. This serum was injected subcutaneously in 40 cubic centimeter doses after a previous cutaneous test had been made to ascertain the susceptibility to anaphylaxis. A marked general reaction followed in 50 per cent of these patients with rise of temperature and the typical skin eruption of serum sickness. When the reaction subsided these patients showed a beginning resolution of the pelvic infection, reduction of pain and tenderness, a decrease, and in some cases complete cessation of the vaginal discharge. Because of severe reactions in 2 cases as manifested by extreme illness from the injections, and because of no improvement in the pelvic infection unless a reaction was obtained, the use of this therapy was discon-

tinued. The risk involved and the lack of uniform results from its employment did not warrant its continued use.

Diathermy as a therapeutic agent, has yielded definite results when applied to pelvic infections of gonorrhoeal origin. The penetration of the pelvic structures by an electrical high frequency current through properly placed electrodes generates heat in the tissues to varying degrees. The intensity of the heat can be controlled by the size of the electrodes and the amount of current utilized, measured in milliamperes. It is an established fact that the gonococcus is susceptible to comparatively low degrees of heat. An exposure to 42 degrees C for 10 minutes will destroy it completely. By the use of diathermy, a temperature of 45 degrees C can be generated in pelvic structures without discomfort to the patient or damage to the tissues. Destruction of the gonococcus is thereby assured. By means of experimental work upon rats and dogs I have demonstrated that skin, subcutaneous tissue, bone, and the internal pelvic

of the vault of the cranium by communication of the meningeal vessels with the external skin by means of an opening in the bone.

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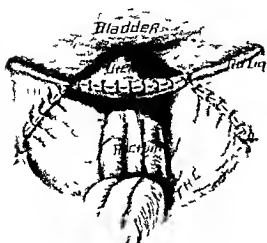


Fig 5 Round ligaments have been implanted and broad ligaments and funiculus uteri sutured

applications as well as by the use of the Corbus thermophore in the urethra. Abdominal operations were performed upon 832 patients whose history or physical findings indicated recurrent adnexal inflammation. Fifty-four patients who had concomitant pelvic abscesses with tubal infection were drained through the vagina. 3 deaths occurred a mortality of 5.5 per cent.

In the entire series of 887 operative cases there were 44 deaths a mortality of 4.6 per cent.

When patients with an initial attack of acute salpingitis were admitted they were treated by the conservative measures already outlined. Resolution as a rule, occurred and in some instances the tubal lumen apparently became re-established. This was particularly true if it was possible to free the lower genital tract of infection. A few cases of this type were operated upon in the presence of pronounced right-sided pain; they were mistaken for cases of appendicitis. Under such circumstances the adnexa were not disturbed and the abdomen was closed.

During an exacerbation of a recurrent chronic infection surgical interference was performed only when there was evidence that the infection was spreading beyond the pelvis and producing a generalized peritonitis. Spontaneous rupture of a pyosalpinx or tubo-ovarian abscess occurs infrequently but when



Fig 6 Giant pyosalpinx of left side adherent to hilum of spleen. Tubo-ovarian abscess present in right side

such an accident does occur generalized peritonitis develops and operative interference should not be delayed.

When a pelvic abscess forms drainage by the vaginal route is established and laparotomy is deferred until a later date.

The abdomen was opened in the presence of acute symptoms 81 times. When there was definite evidence that a chronic infection was present the pathological masses were removed if feasible otherwise proper drainage only was established.

The chronic cases of adnexal infection presented interesting variations in pathology. Some showed slightly thickened tubes the fimbriated ends of which were or were not occluded; adhesions were few in some instances in others dense. Some tubes were greatly thickened and fibrosed and densely adherent to surrounding pelvic structures most contained a purulent exudate of varying consistency that as a rule proved sterile. The tubes were often much enlarged containing thick creamy pus communications between the pyosalpinx and ovary forming tubo-ovarian

He found twelve congenital cases in the literature. The remainder were traumatic in origin.

He was of the opinion that direct compression was the best method of treatment. He further expressed the belief that if the growth is continuous and rapid, extirpation should be the method of choice.

The first successful operative case was reported by Franke, 1902. An abstract of it follows:

A serving maid 20 years old with negative personal and family history in early childhood had behind the right ear a slight depression in the bone. Later she observed that in the prone position a soft tumor which was readily displaceable appeared upon the right posterior half of the cranium and at first had caused no disturbance but had a few years previously provoked headache and had gradually increased in size so that the patient was unable to stoop without provoking extremely severe pains which had finally become so intense as to render her unfit for work. Application of iodine was prescribed without result.

Examination revealed a well nourished female of healthy appearance who presented upon the upper posterior portion of the cranium a soft superficial slightly fluctuating depressible tumor covered with normal skin. It was painless on pressure. A shallow depression in the cranium was palpable. Following removal of the hair the tumor appeared more prominent with the patient in the half sitting position and with slight stooping it exhibited an uneven surface.

On bowing the head the tumor increased markedly in size and the skin which had previously appeared normal assumed a slightly bluish tint. Slight pulsation of the tumor was then marked but when the patient returned to the erect position it disappeared almost entirely and no longer pulsated.

A slight globular pulsating prominence was observed behind the right ear about 1 centimeter from the insertion of the auricular muscle and some what above a horizontal line drawn through the upper wall of the external auditory meatus. A tentative diagnosis of diffused reticulated angoma or blood cyst was made.

At operation a longitudinal incision was made over the tumor and a dark brownish red membrane was exposed and freely dissected away from the anterior and inferior margin of the tumor. An attempt to detach this membrane from the roof of the cranium caused laceration of the former and permitted the release of a large stream of venous blood which was checked by compression with tampons of iodoform gauze. Efforts to detach the cystic wall at other points led to repeated hemorrhages. The author was about to discontinue the operation on account of impending shock and salt

solution was administered however the operation was continued and on careful removal of the tampon a circular aperture which permitted the insertion of the tip of the finger was encountered at the anterior end of the tip of the depression in the cranial roof. No free communication with a sinus was remarked at these points and no angiomatous or cavernous degeneration was noted either in skin or bone surrounding the cyst. The incision was closed by means of sutures. The openings in the cranium were closed with tampons of iodoform gauze and a tight compression bandage was applied.

It will be noted that a pre operative diagnosis of sinus pericranii was not made. The operation consisted of incision, evacuation of the contents and tamponade.

Six years later (1908) Arnheim presented

A male patient aged 20 years with tumor of the soft parts over the right frontal bone which was attributed by the latter to a fall upon the forehead sustained some 6 years previously. On account of other injuries suffered in the same fall the patient was obliged to remain 3 weeks in bed on arising from which he noted for the first time the existence of the tumor which was declared to have retained meanwhile its original character. The tumor itself varied in size according to the position of the head. It was barely visible when the head was held erect and appeared as if withdrawn into the cranium leaving in its place a depression which admitted the tip of the finger but when the head was inclined in a forward direction or the patient coughed or breathed deeply the tumor attained the approximate size of a walnut and the skin which covered it assumed a bluish red color and revealed marked pulsation. When the patient stood up and pressure was exerted upon the tumor with the tip of the finger it diminished rapidly in size and when all blood had left it an umbilicate depression was felt in the frontal bone.

The chief value to be attributed to this report is the theory of formation of sinus pericranii. While it is true that this is a repetition of Stromeyer's opinion of the formation of traumatic cases quotation of this in full should be of service.

In the case reported in this article it was assumed that a vein had been torn from its bony support in the periosteum by the fall and that a copious effusion of blood had occurred in consequence and had remained in constant communication with the anterior of the cranium through the vein which was no longer capable of retraction and occlusion in the rigidly walled bony canal. The effusion was in part resorbed but complete reunion of the separated soft parts was impossible since fresh blood continually flowed from the open vein. The wall of

active infective process and that one of 60 minutes, or less suggests a latent infection. Friedlander (5) prefers not to operate upon pelvic infections until the sedimentation time is well above 60 minutes. In a previous article (2) the writer presented a comparison of the relative value of the leucocyte count and sedimentation time of the erythrocytes in a group of 71 patients operated upon for adnexal disease. Twenty nine patients of this group showed a sedimentation time of less than 30 minutes but their average leucocyte count was 13,250. There was no mortality and the morbidity averaged 18.2 days. Twenty six patients showed a sedimentation time of between 30 and 60 minutes with an average leucocyte count of 10,200. There were no deaths and the morbidity averaged 16 days. The rest of the group 16 patients had a sedimentation time above 60 minutes with an average leucocyte count of 10,200. One death occurred in this group from a general peritonitis with the sedimentation time of 68 minutes.

From these comparative results as well as from other isolated instances one cannot help but believe that in estimating the activity of an infective process greater reliance should be placed upon the white cell count than upon the sedimentation of the red cells.

At operation I first dispose of the endocervicitis either by performing a tracheloplastic operation or by thoroughly cauterizing the endocervical mucosa. The abdomen is then opened and the tubo ovarian masses removed. No attempt is made to salvage portions of damaged ovaries or tubes. In previous years such attempts at conservation were frequently made with disappointing results. In 10 such instances it was necessary to evacuate secondary abscess formations by colpotomy.

In patients with extensively involved adnexa a fundal or supravaginal hysterectomy was done in order to extirpate all infective foci. This operative maneuver was performed 159 times. When ovaries appeared normal they were suspended to the fundus uteri by shortening the utero ovarian ligament. The ovaries were conserved in 401 cases.

In many instances upon removal of both tubes with retention of one or both ovaries

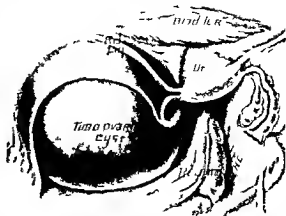


Fig. 9. Large tubo ovarian cyst simulating intraligamentous mass.

the uterus was suspended either by a fixation suture or shortening of the round ligaments. This was done to prevent a postoperative retrodisplacement which will otherwise occur in 70 per cent of cases.

In the separation of adhesions care was taken to prevent injury to the intestinal walls. The judicious use of sharp dissection where blunt separation seemed harmful prevented many such injuries. In some instances portions of the inflammatory masses were cut away and allowed to remain attached to the gut wall rather than risk perforation. In spite of this extreme care in technique accidental intestinal opening occurred 12 times, 5 times in the sigmoid and 7 times in the small intestine. Resection was necessary in 1 case, otherwise single suture sufficed. No deaths occurred from injury to the large gut but 4 patients died from the injuries to the small gut, a mortality of 33 1/3 per cent.

Among the 833 abdominal sections for adnexal disease pus was encountered and the peritoneal cavity was soiled 324 times. When such an accident happens the question of whether or not to institute drainage is naturally foremost in the mind of the surgeon. To determine which pus cases require drainage many things must be taken into consideration. Practically speaking all these adnexal infections originated as gonorrhoeal inflammation. The chronicity and subsequent acute

spaces was at times positive and at times negative according to the position of the head. In order to establish a firm cicatricial adhesion of the scalp to the region of depression the periosteum was pushed back the perforations were cauterized and the galea was firmly sutured over all. This procedure sufficed with slightest pressure in the sinus to prevent the passage of blood while complete disappearance of subjective disturbances also followed in due course.

After an exhaustive study of the literature particularly with reference to the attempts at classification of various cases into separate groups, Mueller concludes: 'Clinically the anamnesis offers the chief distinguishing mark in determining whether a tumor is congenital or traumatic. The disease rests with certainty upon a vascular anomaly.' He believes that there is very little justification for dividing the cases into separate groups.

The operative treatment according to Mueller must consist in the removal of the sac and the closing of the opening through which it communicates with the interior of the skull.

Mueller's case

A girl aged 23 years sought the aid of the clinic on account of a small swelling which lay in the region of the left parietal eminence and which had lately been the cause of severe pains in the head. When the patient kept the head in an upright position the swelling was small and scarcely noticeable but when the head was bent either forward or backward the swelling increased to about the size of a walnut. Upon returning the head to an upright position the swelling again disappeared. The tumor was soft and fluctuating. When the patient stood the tumor could be made even smaller than usual by pressing upon it; its contents doubtless going into the interior of the skull. In sneezing and coughing there was an increase in the size of the formation but this could not be brought about by a compression of the *venae jugulares*. There was no pulsation. When the tumor emptied a depression in the underlying bone with a distinct margin could be felt plainly especially in the anterior part. The bony skull under the tumor felt the same as in an impression fracture except that a real defect was present. The roentgen examination showed no mistakably the depression which could be felt. The Wassermann test was negative. A test puncture showed circulating blood as the contents of the cyst. The patient had had this defect ever since her earliest childhood. The pains in the forehead of which the patient complained were the cause of the operation which was performed under narcosis

by Hildebrand on October 20, 1911. The skin above the tumor was cut off in the form of a flap. Immediately under the scalp there was a sac composed of many bays and a circular incision was made around its base to the bone. In this incision different vessels which led to various places in the vicinity were severed and subjected to ligatures. The whole tumor was then removed from its pedicle together with the periosteum. The flat depression in the bone which has been mentioned was thus brought into view and except that it seemed somewhat thinner than normal the bone appeared otherwise quite normal. Fresh blood flowed in a constant stream but without pulsation from two small emissaries, the one larger and as thick as a pin and the other extremely thin. Since the bleeding did not stop upon the application of tampons the point of an ivory needle was introduced into each of the very fine openings and the shaft then taken off close to the bone. They were then tamponed with iodoform gauze, a suture of the skin made and compression bandages applied. Convalescence was smooth.

Pathologist's report. The small tumor consisted of fine network with numerous septa. Microscopically it was composed of a great number of narrow canals filled with blood in parts of which an endothelium lining is visible. The formation measured by its histological structure would be designated as a sort of cavernous angioma but of an exceedingly venous character since it is enclosed in the venous circulation. It receives its inflow from two emissaries in the sinus in the interior of the skull; its outflow follows the veins of the scalp.

Borchard in 1916 restated the misconception that Stromeyer included only traumatic cases under the title of sinus pericranii as evidenced by 'the source of the disease is a fracture of the skull caused by a blow from some blunt instrument. The congenital cephalohæmatocèles which are also regarded as venous angioma by Lannelongue, do not belong here.

He reports in detail the following case:

K. M. 27 years old had fallen upon the rear part of the head 13 years previously in running upon the ice. Patient had been unconscious for 34 hours but had then returned home alone and had remained several days in bed. After 14 days a tumor had formed fairly suddenly on the right side of the occiput and had continued to increase in size. The size of the tumor increased or decreased with each change of position but after the first year it grew no larger. In case of strong exertion or of bending over the patient felt severe pains on the right side of the neck and across the right side of the head to the right eye.

On the right occiput at a distance of 3 centimeters from the median line corresponding exactly to the

the palliative methods as it caused a resolution of pelvic masses in 66.6 per cent of patients besides relieving pain in practically 100 per cent. It also by proper application of electrodes controlled the infection of the lower genital tract.

5 Initial acute attacks of adnexal inflammation should not be treated surgically as they spontaneously subside. Re-infection should not occur if the lower genital tract is properly treated.

6 Recurrent attacks of pelvic inflammation are excellent reasons for the surgical removal of the pelvic lesions. Such surgical procedures can be performed with a reasonable assurance of not more than a 3 per cent operative mortality if the temperature has remained normal for 3 to 10 days and the leucocyte count is below 16,000.

7 When in the course of operative removal of infected adnexa pus contaminates the per-

itoneal cavity the best results as to mortality and wound union are obtained by closure of the abdomen without drainage. If drainage is necessary the vaginal route is better than the abdominal.

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crani of Stromeier, (4) varix herniosus sinus sagittalis—is a bulging of the sinus sagittalis through an opening in the skull

All writers agree with Sudhoff when he states 'The clinical picture is always the same' It will simplify matters greatly if further attempts to differentiate be avoided except as to the etiology

Sudhoff describes the operative procedures which have been used and expresses preference for Payr's operation 'He dissects the sinus after he has cut around it to the bone, raises it as far as the pedicle, ligates the pedicle, and closes the opening in the skull with a paraffin or wax plug This is either inserted immediately, or else after he has bored a tiny hole in order to locate the origin of the communicating vein Three cases were so operated upon in the author's clinic The result was very good'

SUMMARY

1 Sinus pericranii as described by Stromeier in 1850 included both congenital and acquired lesions

2 The clinical picture is always the same in both types A soft fluctuating slowly growing vascular tumor of the scalp which communicates directly with an intracranial sinus through an anomalous opening of congenital or acquired origin These tumors as a rule are not evident when the patient is erect but they become prominent when the patient coughs sneezes compresses the jugular vein or does anything which increases intracranial pressure and which interferes with venous return from the skull

3 The tumor is reducible into the skull

4 A bony defect is evident on palpation

5 The X ray is invaluable as a diagnostic means The anomalous communication is demonstrated beyond question

6 Endothelial lining of the walls of a tumor differentiates the congenital from the acquired type The latter has a connective tissue lining

7 Surgery is the only rational means of cure

8 The procedure followed in this case was suggested by Professor Rudolph Matas

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I wish to thank Dr Prior C. Myers and Dr Research Department of the American College of Surgeons for the valuable prints and material prepared for me

slow in showing themselves. Complete co-operation is essential. Massage of the facial muscles is instituted once a day beginning 10 days after operation and a small faradic battery is used twice a day, one electrode being held in the hand and the other placed just below the lobe of the ear. In about 60 days the patient senses the fact that the face 'feels different' and as the first patient expressed it 'seems to be more alive than before and not so flabby'. A little later a twitch is felt in the muscles in front of the ear when the current is turned on. In 90 days this twitch can be brought about voluntarily by asking the patient to move the tongue from side to side in the mouth and press it against the lingual surface of the teeth. From that time on the patient should practice facial movements in front of a mirror, always keeping within the limit of muscle fatigue. When improvement ceases cannot as yet be told. The first patient writes 19 months after operation that she is still improving. The amount of restoration of

emotional expression seems to depend on two factors: first faithful practice and second the mentality of the patient.

CASE REPORTS

CASE 1. Mrs. S., age 43 years, was referred by Drs. W. F. Callias and J. B. Potts on March 8, 1924. Three years and 4 months before this time, November 1920, she was operated upon for sarcoma of the middle ear on the left side. Following the operation the left side of her face was paralyzed for 9 weeks and subsequently she recovered completely. Two years and 7 months ago the ear was cauterized with carbolic acid and a small dose of radium administered. This was again followed by facial paralysis. She was beginning to recover when she had a recurrence of the original growth. This was again curetted out and in November 1921 60 milligrams of radium was inserted in the middle ear and allowed to remain for 18 hours. Three weeks later the facial muscles began to lose their power and since that

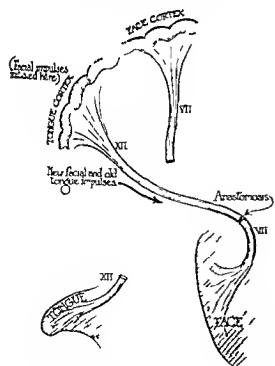


Fig. 2. Path of impulses if facial cortex ceases to function directly. (After Gibson.)

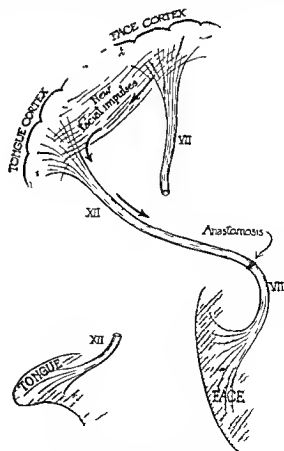


Fig. 3. Path of impulses if facial cortex functions through hypoglossal cortex. (After Gibson.)

amazing byposensitiveness of areas in the stomach gall bladder and appendix, despite the presence of extensive disease as disclosed by operation

Intra abdominal tenderness signifies some form of intra abdominal lesion, the diagnosis of which does not come within the domain of this paper. Parietal tenderness exceptionally may be due to a variety of local lesions as dermatitis cellulitis myositis trauma abscess etc. of the abdominal wall but they will also be dismissed without further discussion.

Usually parietal abdominal tenderness is caused by neuralgia of the lower six intercostal and first lumbar nerves. Involvement of a single nerve is rare. Bilateral involvement is fairly common. Usually several adjacent nerves on one side only are affected. Not infrequently all twelve intercostals and the first lumbar as well as additional lumbar nerves and some of the cervical nerves may be involved either unilaterally or bilaterally. It is a curious and very striking fact however that almost without exception the only spontaneous pain of which the patients complain is felt in some part of the soft abdomen irrespective of the number of nerves involved. Patients almost never volunteer a statement that they have any pain over the rib area and when asked leading questions they nearly always deny rib area pain with the exception that spontaneous pain may be present in the breasts of women. They are nearly all convinced their abdominal pains are deep seated, that is inside the abdomen and not in the parietes.

The area of spontaneous abdominal pain is usually smaller than the area of abdominal tenderness.

In making tests for tenderness comparison should be made between an area of normal sensation and the particular area under examination. Usually the comparison is best made by testing corresponding areas on opposite sides of the midline. When the lesion is bilateral, an area of normal sensation should be selected over an arm leg neck or upper chest. Some of the tests for tenderness require intelligent co-operation on the part of the patient and are therefore of decidedly less value in mentally incompetent patients.

Tenderness due to intercostal neuralgia can be demonstrated in a number of ways.

1 *By deep pressure* Tenderness over the terminal branches of the parietal nerves may be demonstrated by the firm pressure of palpating fingers both when the abdominal muscles are relaxed as in test A and when they are tense as in test B. Usually the tenderness is not uniform throughout the hypersensitive area. The most marked tenderness is commonly found along the outer border of the rectus muscle in localized points which probably coincide with the points at which the nerve branches pierce the posterior layer of the rectus sheath.

2 *By pinch test* Pinching of the skin and subcutaneous fat between the examiner's thumb and finger is the simplest, easiest, and most practical test for ascertaining the approximate area of tenderness. An interesting application of this test may be made in unilateral cases in which the hyperæsthesia approaches the midline by picking up a fold of fat and skin on each side of the midline and pinching it between thumb and finger whereupon the patient will complain of pain on the affected side only. Another modification of this test consists of pressing skin and fat (without disturbance of peritoneum or muscles) against the inner side of the anterior superior spine of the ilium. The area of tenderness as demonstrated by the pinch test is usually smaller than the area of deep pressure tenderness but is usually larger than the area of epicutaneous hyperæsthesia as shown by the next test.

3 *By superficial skin tests* As a rule skin hyperæsthesia is revealed by pricking with a pin by stroking with a cotton wisp and by applying heat and cold. In exceptional cases all these tests may reveal an area of hyperæsthesia instead of the usual area of hyperæsthesia. It is an interesting fact that in these cases of superficial hypæsthesia the (1) deep pressure and the (2) pinch tests both reveal hyperæsthesia.

4 *By pressure on nerve trunks* Tenderness will be found along the course of the nerve trunks supplying the tender area. This tenderness is easily demonstrable in the case of the seventh eighth ninth and tenth intercostal nerves and less so in the eleventh and twelfth



Fig. 8. Case 1. March 8, 1924, showing face in repose, patient attempting to close eyes, trying to whistle, and attempting to show teeth.



Fig. 9. Case 1. January 10, 1925, 10 months and 24 days after operation, showing face in repose, patient attempting to close eye, trying to whistle, and attempting to show teeth.



Fig. 10. Case 1. August 22, 1925, 17 months after operation, showing face in repose, patient attempting to whistle, attempting to show teeth, and attempting to close eye.

intercostal nerves gives rise to pseudo angina pectoris and probably also to some of the cases regarded as true angina. The entire arm may be painful and tender when the neuralgia affects adjacent cervical nerves. When the ilio-inguinal nerve is involved a band of tenderness on pressure or pinching up to 2 inches in width may be found below and parallel to Poupart's ligament and pinching of the two labia majora simultaneously between thumb and finger may reveal hypersensitive-ness of the labium on the affected side only. When the last intercostal and first lumbar nerves are affected there is very commonly found an area very sensitive to pressure over the upper part of the buttock just beneath the crest of the ilium well posterior to the great trochanter. Demonstration to medical consultants of this area of buttock tenderness has proved a very valuable aid in convincing them that the patient under examination has parietal rather than intra abdominal tenderness. I believe this buttock area of hypersensitivity is due to involvement of the iliac branches of the ilio inguinal and iliohypogastric nerves. Textbooks of anatomy describe a fairly large branch from the twelfth intercostal which supplies the skin of the trochanteric region. On theoretical grounds it might be argued that hypersensitivity should be encountered very frequently in the trochanteric region but I have very seldom found it. The usual area of buttock tenderness varies in depth and width. It may be only the size of a finger tip or it may extend laterally for a distance of 2 or 3 inches and may extend downward to a line about on a level with the tip of the great trochanter. Tenderness extending below this level is much less common and when present is due to involvement of lumbar nerves from the second on down. Meralgia parasthetica seems to be a very puzzling disease to the ones who have written about it but in my experience it is simply an expression in the second lumbar nerve of the same form of neuralgia as affects the intercostal nerves and it is often found in association with the latter.

The tests which have been described are usually very valuable in making a differential diagnosis between parietal neuralgia and early peritonitis, but the examiner must keep in

mind that under certain circumstances the B test may prove misleading in cases of peritonitis. When peritonitis either acute or as a local abscess involves the anterior parietal peritoneum and particularly if the inflammation having penetrated the peritoneum involves the muscles tenderness may be elicited even when the muscles are tense in the B stage of the test. Again patients particularly multiparous women with very flabby abdominal muscles may be unable in the B test to tense their muscles adequately to exclude an intra abdominal tenderness. If these two possible sources of error are kept in mind a faulty diagnosis can be averted by a careful analysis of the numbered tests and by finding other characteristic evidences of the intra abdominal lesion. All of the signs of intercostal neuralgia may be associated with peritonitis. Usually however, in peritonitis the tenderness is limited to the abdominal wall and does not involve the nerve trunks, the buttocks or the transverse processes of the vertebrae.

For the sake of brevity and for lack of a more suitable designation, I am using the term 'intercostal neuralgia' in this paper to include every lesion which can give rise to pain and tenderness in any or all of the twenty four intercostal nerves and the two first lumbar nerves. In a minor percentage of cases intercostal neuralgia may occur as a disease *per se* as for instance from exposure to cold such as occurs in the early spring months when boys go in swimming and lie naked on the riverbank exposed to raw winds. As a rule however intercostal neuralgia is only a syndrome which may be present in any one of a great variety of lesions which involve the spinal cord or the intercostal nerve roots trunks or terminals. The underlying disease may be an irritative lesion of the sensory tracts in the spinal cord any form of spinal meningitis particularly syphilitic and tuberculous a disease of intercostal sensory nerve roots or ganglia as in herpes zoster sarcoma secondary carcinoma tuberculous or syphilitic of the vertebrae various forms of arthritis and osteoarthritis of the spine typhoid spondylitis abnormal curvature of the spine postural strains of spine trauma either direct or indirect to the spinal



Fig. 12 Case 2 September 1, 1925, 6 months and 1 day after operation showing face in repose patient attempting to close eyes trying to whistle and attempting to show teeth

one thing it feels different in some way. And another thing is when I first get up in the morning the corner of my mouth jumps. That is all I have noticed so far.

July 1 a letter says: Sometimes I can move the left side of my mouth so that both sides look the same. August 25 she writes: I can use the left side of my face to quite an extent now. On September 17 1925 the patient came to Omaha and the photographs (Fig. 12) show the condition at that time. She still has a little difficulty with the tongue. Her speech is a little imperfect especially when she uses the labials. At this time she was quite discouraged but on November 29 1925 she writes: "I have noticed while resting it with battery that my upper lip pulls upward as if something was pulling it and while practicing in front of a mirror I can do it voluntarily sometimes but not always. My left eyelids have been twitching a good deal lately."

Judging by the result in these two cases it seems fair to assume that this operation will not only restore facial symmetry and voluntary motion to the facial muscles but also bring about the return of a certain amount of emotional expression the amount depending largely upon the mental development of the patient.

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toxic intercostal pain and tenderness promptly subside within 3 to 7 days and the patient is believed to have been cured of his parietal pain and tenderness by the appendectomy.

It is the patients with intercostal neuralgia in a chronic form who constitute the majority of the cases that are subjected to gastro intestinal X ray studies and who are mainly responsible for 90 per cent of all gastro intestinal X ray examinations proving negative. These same patients are subjected to test meals bile drainage cholecystograms cystoscopies ureteral catheterizations pyelograms vaginal and proctoscopic examinations and various laboratory tests of urine blood feces spinal fluid etc., in the vain effort to discover the cause of pain and tenderness which are in no way dependent upon an intra abdominal lesion. If, as commonly happens all these examinations prove negative the patient is either subjected to a futile exploratory laparotomy or is discharged from the hospital with advice as to treatment which proves barren of results and the patient then starts on his career of entering hospital after hospital to have expensive examinations repeated time after time. On the other hand if examination reveals an intra abdominal lesion its operative correction will very seldom exert any influence upon the course of the intercostal neuralgia and the patient will complain of the same pain and tenderness after operation. During the first few days after operation the patient is reassured by being told that his symptoms are due to the transient pain and soreness of the wound but as he continues to complain up to the minute of his discharge from hospital he is lucky if he escapes the stigma of being called a 'neurotic'. A persistence of the same pain and tenderness for many months induces the patient to seek another hospital where the various intra abdominal examinations are repeated and all of them proving negative the patient is operated upon for 'adhesions' which are seldom found and the intercostal pains and tenderness continue unabated. If the patient is a woman she is quite apt to have three operations, first an appendectomy then a salpingo oophorectomy and then an operation for adhesions. Thereafter she follows after strange cults, becomes a dope fiend or

if pains are unusually severe commits suicide. Much time trouble and expense can be saved patients physicians and hospitals by spending one minute in employing the A and B two stage test as a part of the routine examination of all abdomens in which tenderness is encountered. The A and B test in cases of intercostal neuralgia will immediately disclose the fact that the tenderness is parietal and that after exclusion of a possible peritonitis, further examinations should be conducted to discover the underlying cause of the nerve lesion rather than to hunt for an intra abdominal lesion which is not likely to be found or if found is almost certainly not the cause of the parietal pain and tenderness.

I believe that the teaching of Sir James Mackenzie and his followers that pain and tenderness of the abdominal wall should be regarded as a visceroparietal reflex indicative of an intra abdominal lesion has resulted in many erroneous diagnoses and needless operations. Mackenzie believes the intra abdominal viscera which are not supplied by nerves of pain sense and therefore when diseased cannot manifest pain in themselves will when diseased send stimuli over a sympathetic branch to the spinal cord and create therein an irritable segmental focus with the result that the normal afferent impulses coming from the skin and muscles over the intercostal nerve to that irritated spinal segment will give rise to painful impressions which are in turn referred over the intercostal efferent fibers to the peripheral tissues. Mackenzie and his disciples have focussed their attention upon the comparatively small abdominal area of spontaneous pain and localized tenderness as described under (2) the pinch test and (3) the superficial skin tests and they have failed to realize how widespread the intercostal nerve involvement may be in these cases as shown by tests 4 5 6 and 7. They believe the maximum point of parietal tenderness is an index to the particular viscus which is diseased. I have tried out their theories and I have been unable to convince myself of the correctness of their views in the vast majority of cases that come under my observation. Their views may hold good in exceptional cases as for instance in gastric or duodenal



Fig. 1. Photograph showing line of incision.

Follow-up notes. June 25 1923. Patient reports that he has been feeling well since operation. He has not noted a recurrence of the swelling but there is a funny feeling on the right side of the head when he raises anything heavy. Examination shows that the scar is covered by hair and no recurrence of swelling and no induration along the course of the jugular vein are found. An anomalous opening in the skull can be palpated.

February 19 1925. Recently patient has complained of top of his head (by this patient refers to the occipital region) and some dizziness at times when working. Examination of the site of the previous operation shows the scar to be smooth and not elevated. The mass which he complains of is not adherent to the skin and is slightly movable. **Diagnosis:** neurofibromata.

Operation. March 2 1925. To the right of the posterior midline there are large vascular channels everywhere. Two neurofibromata were removed. The specimen was sent to the laboratory.

August 15 1925. On the right side of the head at a point about 20 centimeters from the nasion and just below the level of the supra-orbital ridge a depression large enough to admit the tip of the index finger is found. The edge of the depression is irregular. The skin covering the scar of the original operative wound is freely movable over the skull. The patient is free of symptoms.

But a careful review of the literature it came to me that this case belongs undoubtedly to the type of Stromeier's sinus



Fig. 2. Roentgenogram of patient.

pericranii. The outstanding features of the case are:

1. The vascular pericranial tumor communicated directly with the lateral sinus through an anomalous opening.

The anomalous opening was probably congenital in origin.

3. It was not associated with the history of trauma.

4. The association of this tumor with von Recklinghausen's disease is an unusual finding. Whether there is any relationship between the two is impossible to say, but it offers unusual opportunity for speculation.

5. With the exception of headache and discomfort when leaning back or stooping forward the patient suffered no inconvenience.

6. There was no bruit or expansile pulsations.

7. The walls of the tumor were lined with endothelium.

The significance of some of these characteristics will be better appreciated after reviewing some of the reported cases. The cases which prompted Stromeier to suggest the term *sinus pericranii* were reported by him in the *Deutsche Klinik*, 1850.

The first of these concerned a boy of 6 years who during his second year had fallen from a considerable height upon his head and sustained a depression of the sagittal suture. At its deepest point the depres-

distribution of his nerve supply. The severity, extent and location of the pain and tenderness in intercostal neuralgia are extremely variable at different times and this variability has been assigned as additional evidence of the patient being a neurotic or semi-malingering. It has been my experience however that these variations as claimed by the individual patients are entirely consistent with the physical findings particularly from the anatomical standpoint. It is not unusual to see a patient's pain and tenderness entirely disappear as the result of two or more days of rest in bed and then recur shortly after getting out of bed. The spontaneous pain and the nerve trunk tenderness disappear before the nerve terminal tenderness in those cases in which the symptoms subside while under observation. Patients are commonly worse after physical activity but on the other hand I have occasionally seen mild localized symptoms become severe and widespread on confinement to bed due probably to a mattress or springs which caused harmful strain on the vertebral column. I have seen a patient in such severe

pain and exquisite tenderness from intercostal neuralgia despite large doses of morphine that he attempted suicide by jumping out of a sixth story hospital window in the evening and yet on the following morning his pain was entirely gone and his tenderness was barely demonstrable. An intercurrent toxæmia is prone to cause an exacerbation of symptoms in chronic intercostal neuralgia. All these variations in symptoms are due to the vagaries of the disease and are not to be regarded as evidence of the patient being a semi-malingering.

With all its numerous ramifications intercostal neuralgia is a rather complex disease or more often a symptom complex encountered in many different diseases but its signs and symptoms are so characteristic that the diagnosis can be made readily provided the examination of the patient is conducted along the proper lines.

The limits of this paper prevent my quoting from the literature citing illustrative cases and dealing with the treatment but I hope to write on these phases of intercostal neuralgia in the near future.

median line. He was rendered unconscious at once and was carried off the battle field. He did not regain consciousness for 24 hours. The surgeon who treated him said that he had a fracture of the skull. The ultimate result of this wound was that he was incapacitated from following his profession of a soldier. When he leaned forward with his head toward the ground there was formed a swelling the size of a nut at the site of the lesion. This swelling was violet in color and disappeared when he raised his head.

In 1847 the surgeon M. Hutin made a detailed examination of all the living veterans and he took a great interest in this case. He found no apparent scar but there was a very evident depression due probably to the result of absorption of a part of the diploe. The sac which was formed of very thin skin was not apparent when the patient was in the upright position seated or lying on his back but when he leaned forward the sac became evident and was about the size of half an egg. It was livid in color due to the presence of blood and no doubt was formed in the same manner as cysts are usually formed in contused tissues. It could not be determined whether there was an opening into the superior longitudinal sinus.

On October 28 1851 he was admitted to the infirmary for erysipelas of the neck and upper part of the thorax complicated with chronic bronchitis. In spite of energetic treatment the disease ran its course and patient died November 3.

The autopsy was performed November 5 36 hours after death. The cranium showed nothing abnormal as to the size or protuberances. On the forehead 2 centimeters below the hair line and to the right of the median line there was a small cutaneous area about 2 centimeters in diameter which was distinct from the rest of the skin by its slightly pinkish color its fineness and its wrinkling. It corresponded to a depression of the bone which was very evident on palpation. When the head was placed in a very low position the tumor could not be made to appear.

The brain was normal of firm consistency and was without traces of old or recent areas of apoplexy. The white and gray matter were quite distinct from each other. The vascular network of the pia mater did not show any infiltration and was only moderately injected. The cerebral convolutions were easily detachable even in the vicinity of the lesion. This was not true of the membranes themselves. At 3 centimeters from the falx cerebri on the right side the visceral layer of the arachnoid was lined by the pia mater and adherent to the parietal layer and with the dura mater. On stretching these pathologic tissues a few drops of blood ran into the arachnoidal cavity. Up to this point the dura mater was easily separated from the cranial vault. At 3 centimeters from the falx cerebri separation could not be accomplished without rupturing the adhesions which were present. It was then found that there were many reddish points on the dura

mater which appeared to be the orifices of gaping vessels. In the bone and opposite these vascular mouths there were small solutions of continuity in the tables of the bone. Water poured into this small space was seen to pass promptly under the external skin and the thin portion of skin easily became distended. The injection of water or the insufflation of air through the superior longitudinal sinus as well as the introduction of bristles in the venous canals emanating from the same sinus and their penetration to the site of the lesion showed that there was a pathological communication between the sinus and the openings in the bone and hence into the external sac. It should also be mentioned that the caliber of the vessel appeared to be slightly enlarged and that it was filled with a long reddish, fibrous clot.

The primary etiological factor in this case was trauma. The first symptoms were those of cerebral concussion complicated by direct fracture. Later there was the formation of a sac containing blood. This sac formed a soft non-pulsatile tumor which appeared when the head was inclined forward and disappeared when the head was returned to the upright position. The skin was never affected as to its continuity but it gradually underwent a modification which reduced it to the thinness of a sheet of paper. The skin was sufficiently transparent to allow the first surgeon to diagnose the presence of blood in the tumor. Immediately after the blow there was a depression in the bone at the site of the contusion. This depression was the primary lesion the first link in the pathological chain of events. It is probable that the external table alone was fractured the inner table remaining intact but being subjected to the pressure of bone splinters.

The next question is whether the sac was formed at first or was only secondary. The autopsy findings speak in favor of a secondary development of the blood tumor.

The successive phenomena could have occurred as follows: depression of the surface of the frontal bone obscure osteitis and interstitial absorption at the expense of the tables and diploe of the bone propagation of the inflammatory and adhesive nodus to the corresponding portions of the meninges extension of the ulcerated processes to the meninges increasing the caliber of the vessels or leading to the formation of new vessels finally there were established communications between the arachnoidal vessels and the canals emanating from the superior longitudinal sinus with the openings in the fractured bone and with a circumscribed portion of the external skin the latter becoming distended by the effusion of blood in virtue of physical laws.

In the discussion of his findings Dufour says: "The reducibility of the sac must be considered in the classification of this lesion, which must be considered as a blood hernia."

In this respect what is true as to the injection of dyes is also true as to the injection of bacteria into the blood stream. However as a rule we do not have a sudden injection of bacteria into the blood stream usually there is a slow leak of micro organisms from some focus of infection, so that the blood stream is thus afforded an opportunity to develop bactericidal substances with which to combat the toxias.

There are times when the peripheral circulation is free from bacteria while the spleen, liver, bone marrow etc. may be full. In other words it is perfectly possible that peripheral blood cultures be negative at one examination and a few hours later show many colonies. In addition it is reasonable to assume that there are instances when the peripheral blood stream will show a fluctuation from numerous colonies to a negative culture, for it is a generally accepted fact that bacteria are to be found in the peripheral stream in showers and between these showers no bacteria will be found. If such a hypothesis be true then one cannot with any great degree of certainty attribute the sterilization of the blood stream to any chemical unless we obtain a method of centrally examining also the blood in such organs as the spleen, liver, etc. Such examinations in the human being at least are of course out of consideration and because of the difficulty of such examination in animal experimentation the results are also very uncertain and unsatisfactory.

Dr. George B. Lawson directed the following experiments which were carried out by the resident staff and laboratory personnel of the Jefferson Hospital, Roanoke, Virginia.

A series of four control rabbits of approximately the same size and weight received from 1 cubic centimeter to 1/10 cubic centimeter of a 24 hour culture of streptococcus hemolyticus. This particular culture of streptococcus hemolyticus was obtained from the University of Pennsylvania for in order to have the experiments uniform it was necessary to have some organism which would be constant in its power to produce fatal results. The injections were made into the posterior auricular vein and the animal died in from 6 to

48 hours. A similar series (4) injected with 1/100 cubic centimeter of whole heart's serum obtained at autopsy and injected in the same region also died in the same period of time. All of the rabbits used in the entire experiment weighed from 1/2 to 3 kilograms, though, of course, rabbits of like size were taken for each corresponding experiment.

Four control rabbits received 7 1/2 milligrams of mercurochrome per kilogram of body weight. They received no streptococci but died in an average of 72 hours.

In three series of four rabbits each 5 milligrams, 3 milligrams and 2.5 milligrams of mercurochrome per kilogram of body weight were given respectively in each series but without streptococci. All lived.

In two series of four rabbits each two and later three intravenous injections of 3 and 2.5 milligrams of mercurochrome were given at 4 hour intervals. All lived.

Two rabbits each received 2.5 milligrams of mercurochrome and in addition each was given intravenously 1/100 of a cubic centimeter of whole heart's serum obtained at autopsy from infected animals. Both succumbed in 12 to 24 hours.

Two rabbits receiving 3 milligrams of mercurochrome per kilogram with 1/100 of a cubic centimeter of infected serum died in from 12 to 24 hours.

Another series of two received the same amount of infected serum with few blood cells and 2.5 milligrams of mercurochrome per kilogram. The latter was repeated in 4 hours. The animals died in about the same length of time.

A similar experiment was conducted with 3 milligrams of mercurochrome per kilogram and the latter was repeated in 4 hours with the same result.

Again rabbits (two series of two each) were injected with the same amount of serum. This time the mercurochrome (2.5 and 3 milligrams respectively per kilogram) were given at the time of injection of serum as above and repeated both at 4 and 8 hour intervals but with a similar result.

Finally a series of eight rabbits was used. Six were given 1/100 cubic centimeter of in

The structure of the walls of these tumors, anatomic location, contents, symptoms differential diagnosis as presented by Wislicenus is so well done that it will be well to quote rather extensively "The structure of the tumor walls depend on their origin. Either they have walls of their own from the beginning (as in dilatation of an emissary vein) or they have at first no walls of their own (traumatic) the blood escaping into the soft parts of the skull a capsule being formed later."

The contents of this tumor is always venous blood. The bone below the tumor is frequently affected. It may be either depressed by a trauma or through resorption of the bony substance from continued pressure of the tumor. A communicating opening in the bone could only very rarely be demonstrated.

This last statement can readily be understood because no cases had been operated upon up to this time and only a few had come to autopsy.

The next statement of this author is of particular value since it is prophetic with regard to the curative method of treatment. He says in his discussion "A communicating opening is only of real value if closing it prevents a reappearance of the tumor after a reduction of the latter. In most cases a communicating opening represents the only connection of the tumor cavity with the venous circulation." In spite of this statement more than 30 years elapsed before the first successful operation was done for the cure of this disease by Franke.

The forehead is given as the most frequent site next the sagittal suture then the occiput.

The tumors are usually invisible in the erect position. In some cases they appear only on bending forward or any other movement retarding the return of the venous blood. The size varies greatly. The skin covering the tumor is sometimes so thin that the contents of the latter give it a bluish tint. The consistency of the tumor is always soft and at times a fluctuating area is elicited. Pressure causes the tumor to disappear. Compression of the jugular vein

has a distinct influence on the fullness of the tumor, its volume increases considerably. The patient usually suffers very little. The growth of the tumor is usually slow.

Differential diagnosis is declared to involve especially the distinction of pericranial sinus from meningocele and encephalocele. Absence of hydrocephalic symptoms, bluish coloration of overlying skin, detection of a murmur, absence of indications of cerebral pressure on compression of the tumor and of a pedicle, more rapid and extensive increase in volume of pericranial sinus through inclination of the head or compression of the jugular veins, verification of firmer content, and slow growth are all said to exclude existence of meningocele and to indicate the presence of pericranial sinus in a patient, while in the differential diagnosis between pericranial sinus and encephalocele the following facts should be taken into account, namely that the latter is as slightly transparent as the former, that encephalocele may exhibit a higher degree of resistance than pericranial sinus and usually fails to disappear completely on pressure, that the aperture of communication with the internal portion of the cranium is larger in encephalocele than in pericranial sinus, that encephalocele is almost invariably congenital, and children thus afflicted rarely live long."

In spite of his wonderful study of the subject we find Wislicenus making this statement "A conscientious medical man will therefore never think of operating after the diagnosis of sinus pericrani has been made. It only remains to try to influence the tumor to disappear gradually by long continuous pressure (so far never successful) or to prevent its growth by a suitable apparatus and finally to protect it against traumatism."

Lannelongue in 1886 reported one case and discussed all available cases in the literature. The personal case of Lannelongue was a child who had a soft irreducible tumor on the cranium which was diagnosed angioma. At autopsy it was found that this tumor had a pedicle which extended through the membrane between the two parietal bones and communicated with the longitudinal sinus by means of large veins.

3 When given at $\frac{1}{2}$ hour intervals over a period of 10 hours mercurochrome seemed to check the progress of the condition especially in total doses of 15 to 20 milligram per kilo gram body weight

It was now thought advisable to determine the effect of mercurochrome alone on various internal organs We repeated some of the experimental work done by Dr Hugh H Young and arrived at very similar results

Rabbits were given intravenous injections of 2 5 5 7 5 10 15 20 25 and 30 milligrams per kilogram of body weight and sacrificed at the end of 24 hours Their kidneys livers and spleens were studied microscopically

Following doses up to and including 7 5 milligrams per kilogram the only pathological finding was a cloudy swelling of renal epithelium and liver cells This was variable and occasionally severe

After the larger dosages the pathological changes were of the same character but very much more severe amounting to a coagulation necrosis In the kidney these areas of necrosis were not confined to the cortex but frequently extended down into the medulla while in the liver the necrosis began in the region of the interlobular vessels and extended for a variable distance into the liver lobules Mercurochrome staining of the tissues was observed after the larger doses

When one considers that the ravages of syphilis are usually checked by the proper intravenous administration of some of the arsenic derivatives (neo arsphenamine) the course of malaria most frequently halted by the giving of quinine and perhaps the progress of pneumonia shortened by the use of optochin one should, at least be encouraged in looking for some drug which when given intravenously might influence favorably blood stream infections Of course neither the spirochæta of syphilis nor the plasmodium of malaria are true bacteria but their relationship is sufficiently close to give encouragement in this research work

After all how a drug acts concerns the patient very slightly and frequently his physician less but, what we want to know is does it obtain good results and I only wish the few cases in which we have tried mercurochrome

220 could serve to give us the confidence in the beneficial effects of this dye we would like to have

In the report by Drs Young Hill and Scott there are 213 cases from the various parts of the world many reading like miracles a few apparently complete failures The report, as a whole however gives one the impression that there must be some definite value to mercurochrome-220 for certainly the percentage of recoveries from different types of blood stream infections in desperately ill cases is very much higher than could be attributed merely to coincidence

I will not bore you with a detailed account of our 14 cases further than to say that at least six of them recovered In these cases we believe that mercurochrome 220 was of definite benefit These six cases were as follows

CASE 1 Septicæmia following tonsillitis and thrombosis of jugular vein Streptococcus

CASE 2 Puerperal septicæmia Blood culture streptococcus diplococcus

CASE 3 Puerperal septicæmia and pneumonia Blood culture streptococcus Pleurisy with effusion

CASE 4 Gunshot wound of chest Gram positive cocci mostly diplococci

CASE 5 Puerperal sepsis Gram positive cocci tending toward diplococcus and streptococcus grouping Probably non hæmolytic streptococcus

CASE 6 Multiple osteomyelitis Small gram positive diplococcus

Four out of the 14 patients died and in these mercurochrome 220 apparently had no effect on the progress of infection These cases were as follows

CASE 1 Gunshot wound with a streptococcus blood stream infection

CASE 2 Spreading peritonitis following appendicitis Blood culture streptococcus

CASE 3 Multiple osteomyelitis and epiphysitis with negative blood culture

CASE 4 Streptococcus infection following an abscess of tooth

The remaining four cases we do not feel were influenced one way or the other by mercurochrome 220 They all however went on to recovery whether due to or in spite of mercurochrome 220 I do not think anyone can state with any degree of accuracy

All of our cases had some reaction One patient had a slight gripping pain in the abdo

the cavity gradually became lined with connective tissue and finally the cyst appeared and formed an appendix to the vascular system

It will be noted that the walls of the traumatic type have a connective tissue lining and the congenital tumors have an endothelial lining

Armheim expressed the very conservative attitude with regard to treatment. Witness 'In Armheim's opinion on account of the intimate connection with the sinuses of the cranium treatment should at first be restricted to methodical compression and a plastic operation should be resorted to only in case of necessity

Compare the above with P. Hirsch's expression 'only surgery may be considered the operation to consist of ligature of the veins or suture and the osteoplastic closing of the bone fissure. His case report follows

The patient is a man 47 years old who for 25 years had noticed that when he stooped a small tumor was noticeable on the left side of his forehead. This had given him no trouble at all until during the last year when the tumor had become larger and lately the patient had complained of headache and dizziness. On the left side of the forehead there was a small depression which felt as if the bones of the forehead itself were excavated. In the vicinity was a proliferation of the bone a mound which was sharply limited laterally which ran off toward the middle. With the finger in this cavity one could feel a small fissure through which occasionally pulsation could be felt. The patient was then asked to stoop. The tumor was about the size of a plum and fluctuating. No pulsation could be demonstrated. There was normal skin over the tumor and a few superficial veins traversed the skin. When the patient stood up again the tumor apparently went back apparently in the upper portions first while in the lower part the protuberance could still be made out. There seemed to be a fluid in this sac.

During the following year Krause and Mueller contributed to the subject. The most important surgical contribution is that of Krause who described a carefully planned operative procedure for the cure of sinus pericranii. The essential features of this operation are

- 1 Circular incision
- 2 Separation of the periosteum from the skull at a distance from the line of the incision

3 Removal of part of the bony ring around the pedicle

4 Incision of the tumor

5 Closure of the opening by a flap which consists of skin periosteum and bone

Case report follows

In this case the patient when in the erect position exhibited in the middle of the forehead a depression which was on more careful palpation revealed as a fissure in the bone of 7 millimeters in length and a few millimeters in breadth. On bending a swelling appeared gradually became pulsating then markedly inflated without pulsation and passed over tightly filled veins. The same phenomenon was produced by compression of both jugular veins and also when the patient strained or coughed. The tumor was diagnosed as pericranial sinus (Stromeier). Since with the patient in the dorsal position the tumor disappeared the jugular vein was compressed and the tumor marked out with the knife. Following loosening of the cutaneous flap a circular incision was made around the entire sinus together with the periosteum the latter was incised as far as the bone and the wall of the sinus was pushed aside with the raspator. A pedicle which extended in an inward direction was encountered near the fissure. The bone in the region of the pedicle was removed and the cranial cavity opened whereupon it was perceived that the pedicle was closely united to the longitudinal sinus. A flap of skin periosteum and bone was formed and laid over the defect while the first cutaneous flap was sutured in its place.

Weiting's case an abstract of which follows resulted from trauma. The recital of this case should be of interest because of the unusual operative procedure which consisted of cauterization of the perforations with a view of establishing adhesions.

In a coachman aged 20 years who had sustained a depressed fracture of the right parietal bone the author noted on forward inclination of the head the appearance at the site of the depression of soft fluctuating protrusions which were readily reducible through pressure. Subjective manifestations consisted of a sensation of vertigo and headache. Focal symptoms were absent. A tentative diagnosis of venous blood spaces communicating with the inner regions of the cranium (probably as the result of laceration of the longitudinal sinus) was confirmed by operation. In the shallow region of the depression the skull cap was reduced to the thinness of paper and at five or six points revealed criniform perforations through which communication existed between venous epidural and extradural blood spaces and those situated in part below and in part within the periosteum. Pressure in these blood

ACUTE INTESTINAL OBSTRUCTION DUE TO MALIGNANCY¹

By FRED W. RANKIN, M.D., F.A.C.S., LEXINGTON, KENTUCKY

ACUTE intestinal obstruction superimposed upon malignancy represents a dual condition both factors of which are potentially lethal. The statistics of a large series of cases of acute obstruction from all causes will show that carcinoma of the colon is second to carcinoma of the stomach in incidence in intra abdominal malignancy, and is the etiological factor in acute intestinal obstruction in a very large percentage of cases. Better borne clinically than an acute obstruction in the small intestine because of the less rapid production of acute chemical intoxication resulting from absorption of toxins produced in the obstructed bowel loop, acute colonic obstruction is usually less fulminating in its manifestations and consequently later diagnosed.

Burgess analyzed all cases of acute intestinal obstruction admitted to the Manchester Royal Infirmary over a period of 10 years. In a total of 66,373 surgical admissions he found 1,278 cases of intestinal obstruction including large and small intestine cases. In a total of 485 cases of malignant growth of the large intestine he found 173 cases of acute intestinal obstruction. This series with that of Corner who reviewed the cases of malignant obstruction admitted to St. Thomas Hospital over a period of 11 years, and that of Miller who reviewed 129 cases of cancer of the colon, 25 of which were admitted to the hospital for acute intestinal obstruction is the largest series recorded, but numerous smaller groups of cases show a corresponding percentage of incidence, location of growth and extent of disease found at operation. Burgess analysis showed that his colonic group represented 35.6 per cent of 485 cases of malignant growth of the large intestine and that in the cases of intussusception the colon was concerned in 36.4 cases (28 per cent of the group), while excluding intussusception, the colon was involved in 199 cases, 17.8 per cent. I quote Burgess

paper "We may say that if in any given case of acute intestinal obstruction we can locate the site of the obstruction to the colon and can also exclude strangulated external hernia and intussusception as the cause, then there remains a 91.04 per cent chance of the condition being due to a malignant growth or roughly, 29 to 1 chance." His series showed that acute obstruction occurred in the right colon in 13 per cent and in the left colon in 87 per cent.

With the exception of the rectum the sigmoid flexure is the most frequent site of cancer in the large bowel. With about one third of the colonic malignancies occurring in this segment approximately one half of the acute obstructions are found in this location. The cæcum shows an incidence second to the sigmoid in location of growths, but is far less frequently the site of obstruction (6.3 per cent). This is due to several factors. The growths of the right colon are cellular soft, given to ulceration and produce symptoms of anemia, intoxication and dehydration from absorption and loss of blood rather than from obstruction. Intussusception occurs frequently in this segment and occasionally volvulus associated with malignancy produces an acute obstruction. When the latter condition occurs invariably there is an abnormally long mesentery to the right colon which is continuous with that of the small bowel furnishing the necessary mechanical factors for twisting.

Colloid carcinoma occurs frequently in the right segment of the colon, 22 per cent of Farham's 72 cases in which the cæcum and ascending colon were involved being of this variety. The transverse colon which is second to the sigmoid as a site of acute obstruction showed 7 per cent of 165 cases of the colloid variety while the sigmoid showed only 4 per cent of 138 cases.

Sarcoma of the ileocecal coil occasionally is the underlying factor in an acute right sided colonic obstruction. I reported last

anatomical position of the right sinus transversus there was a longitudinally placed plainly visible tumor 3 centimeters long by 1.5 centimeters high flat and spread out widely over its whole length and covered by skin which was neither thinned nor colored. The tumor felt softly elastic. There was no pulsation. Upon the application of a moderate degree of compression the tumor disappeared slowly but completely into the skull. One could then feel a bony uneven low wall about a depression as large as a finger tip. When the pressure was removed the tumor reappeared slowly but did not attain its original size for several minutes. When he coughed or pressed it it became filled more rapidly. Compression of both jugular veins produced filling of the tumor. If only the right vein was compressed it resulted in no substantial change in the condition. The patient refused to undergo the severe shock of an operation.

This surgeon recognized the value of the operation suggested by Krause.

The outstanding importance of the X-ray as a diagnostic means is pointed out by Borchart. The roentgen pictures alone clear up the whole relationship and provide a viewpoint upon which to base the subsequent choice of the method of operation eventually to be used.

In 1917 Moeng added two cases to the literature.

The first of these was that of a male patient aged 20 years. Four years before he had fallen from a height and had struck the right side of his forehead. As evidence of this there was a swelling. The patient noticed that this swelling stood out when ever he bent his head forward. Recently he had complained of constant headache and dizzy feeling.

On the right side of the forehead could be noticed a slight irregular mass over the bone about the size of a pea. When the head was bent over this place increased to about the size of a walnut. When the head was raised again the tumor entirely disappeared. The X-ray showed no bone changes. At operation there was found a bluish cyst similar to a varix coming out from the bone. The wall of this cyst was as thin as paper and when torn it discharged an amount of fresh venous blood. It could be seen that the bleeding came from three fine openings of needle points in the bone.

The second case is that of a man aged 24 years who could not remember having been seriously ill. On the left side of the head he had always noticed a depression. In this depression there had always been a small protuberance. It could not be ascertained whether his birth had been difficult. He had never had any disturbances attributable to this place in his head. In the summer of 1915 he fell from a munition wagon and struck the left side of

his head. He had not been unconscious and no trouble seemed to have followed this fall. In the beginning of August 1916 he fell from a provision wagon and was for a short time stupefied but not unconscious. He seemed to have no trouble after this fall.

At the end of August the patient noticed that the head became swollen on the left side when he stooped or if he did hard work. At the same time disturbances appeared. He had the feeling as if he were drunk. This feeling appeared if he suddenly stopped when walking fast. At the same time he had severe headaches. Also vomiting appeared and glimmering before the eyes. These troubles decreased somewhat after 14 days in the hospital. The tumor which at first appeared quickly now came more slowly.

The patient is a strong and healthy man, on the left side of the head parallel with the sagittal suture 3.5 centimeters distant from this beginning close behind the left frontal protuberance ran a smooth depression 9 centimeters posteriorly. Forward in the depression there was a protuberance about the size of a five pfennig piece only a few millimeters high. This and a small place in the posterior corner of the depression were painful on pressure. The depression was about 2.5 millimeters wide and diminishes toward both ends. When the patient bends the head forward there comes out over the depression a soft fluctuating tumor about 13 centimeters in length and 3.5 centimeters in width toward the back this becomes very narrow. When the head is raised again the tumor disappears. It may also be felt when both venae jugulares are compressed. It takes 45 seconds to fill again emptying takes about 2 minutes. Roentgen ray examination shows nothing abnormal in the bones. It seems remarkable that through pressure of the fingers at different points of the boundaries of the tumor one could not prevent a filling of the blood sac. No opening in the bone could be felt. This leads one to suppose that there are many openings in the bony skull. Communication with the sinus was shown to exist by test puncture which gave venous blood. Treatment can be only surgical.

Sudhoff in 1914 under the title of A Simple New Operative Method for Sinus Pericranii reviewed the literature extensively. Sudhoff cites Demme's and Heineke's classification, giving preference to the latter as being clearer. The classification of pericranial vascular tumors according to Heineke is (1) Varix simplex communicans—a congenital condition caused by anomalies of the vessels (2) varix racemosus communicans—a bundle of widened veins, likewise congenital (3) varix spurius communicans—which follows trauma and is the sinus peri-

ative recovery and r died from peritonitis following enterostomy

Case 1 Russell Ishmael age 27 male white married A diagnosis was made of carcinoma of the descending colon and acute intestinal obstruction. The complaint was pain in the stomach with nausea and vomiting. The family history was unimportant the father and mother r brother and 3 sisters were living and well. One brother died as a result of lockjaw. The personal history prior to the present illness was negative except for the diseases of childhood which he had without complication.

Present illness. The patient was admitted to the hospital on July 20 1925 with an acute abdominal condition which had been present for 48 hours but which on careful questioning was found to have existed in a subacute manner for 10 days. Since July 8 the patient had been unable to work because of frequent and severe cramping pains in the abdomen. His appetite was good he ate three meals per day during this time and there seemed to be no relation between the food and the pain. He was able to sleep at night and had not been awakened by abdominal distress. The paroxysms had never exceeded 3 or 4 during the day. Forty eight hours prior to admission to the hospital after a meal at 6 p m pain became very severe with nausea and vomiting. This gave some relief but at frequent intervals the paroxysms of pain returned. During the past day he had been in almost constant pain and the abdomen had become distended and uncomfortable nausea and vomiting had been frequent.

The past history was negative for abdominal symptoms with the exception of one attack of pain accompanied by nausea and vomiting 6 years ago. This attack had not recurred and he knew of no reasonable explanation for it. The patient had always been constipated and more so recently. The histories of the genito urinary and cardiovascular systems were negative.

Physical examination. The patient was young and well nourished evidently in acute pain. General examination was negative except for the abdomen. There was marked distention throughout the entire abdomen with considerable muscular rigidity. Tenderness was elicited in epigastrium and right hypochondrium. No palpable mass was made out. The temperature was 99 degrees F pulse 78 respiration 20 blood pressure 120/80. Because of the patient's muscular development no peristaltic movement could be made out in the abdomen. The blood count showed a high leucocyte count 22 800 with polymorphonuclears 86 per cent. The urine was high in specific gravity 1035 showed a trace of albumin and a large quantity of indican. Microscopic examination was negative.

Operation was undertaken immediately. Through a right rectus incision the abdomen was opened and free fluid blood tinged in character was found. The small intestine which presented at the operative

wound was markedly distended the ileocecal valve was sought and it was found that the right colon was filled with gas. Exploration revealed an annular carcinoma of the descending colon which was producing complete obstruction. Because of the distention in the small bowel it was thought wise to do an enterostomy instead of a caecostomy. This was done and a large quantity of fluid intestinal contents were drained out. The patient developed a peritonitis after operation and died on the fourth day.

Autopsy showed the carcinoma in the descending colon close to the sigmoid flexure to be completely obstructing. There was metastasis to the regional lymphatic glands but not to the other abdominal organs. Death was due to peritonitis.

This case represents a type of subacute obstruction which developed into an acute complete obstruction. At the time of admission to the hospital the large bowel was completely shut off and the question of relieving the complete obstruction was the paramount one. The type of operative procedure undertaken was I believe a satisfactory one from the standpoint of judgment but a break in technique in doing an enterostomy may account for the peritonitis.

This case illustrates the possibility of backward pressure in the colon under acute obstructive conditions when a way is forced through the ileocecal valve after a length of time. Normally the valve mechanism is made tighter by increased colonic pressure because the mucous membrane pouts into the cæcum and because the consequent constriction of this portion of the ileum with oedema and infiltration makes a plug under obstructive conditions. Evidently the plug gives way and the liquid content of the right colon is forced back into the small bowel.

Obviously considerable intracolonic pressure is required in those cases in which anatomical relations of the ileocecal valve are such as those just described. Often the valve is a mere opening without protrusion of mucosa into the large bowel and no doubt slight pressure from the distal arm will cause a relaxation of the muscle fibers and consequent dilatation of the small bowel.

Enterostomy I believe might be accomplished more satisfactorily in many of these cases by dividing the terminal ileum several inches from the valve and putting a tube into each end of the cut bowel forcing the distal

INTERCOSTAL NEURALGIA AS A CAUSE OF ABDOMINAL PAIN AND TENDERNESS

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NEURALGIA of the nerves which supply the abdominal walls is a subject which has never received merited recognition in medical literature. It is an exceedingly common affection and failure to recognize its presence inevitably leads to erroneous diagnoses and often results in futile operations.

The nerves which supply the abdominal walls are the lower six intercostal nerves and the iliohypogastric and ilio-inguinal branches of the first lumbar nerve.

Physicians generally are alert to consider and detect intercostal neuralgia in the upper chest wall and yet they commonly fail to consider its possibility or detect its presence in the abdominal wall. Medical practitioners are prone to ignore the fact that intercostal neuralgia causes pain and tenderness over the abdomen which may simulate any one of various intra abdominal gynecological or genito urinary lesions. I see an average of one or two patients a week and sometimes as many as three new patients in one day in whom fairly competent physicians have failed to recognize the superficial neuralgia and have referred the patients for operation for various non-existent intra abdominal lesions.

In order to differentiate between parietal tenderness and intra abdominal tenderness I have devised a simple two stage bedside test which I have not seen mentioned anywhere. (A) In any patient complaining of abdominal pain and tenderness the examiner follows the classical advice of gaining the confidence of both the patient and his muscles and then palpates in the usual manner. Irrespective of whether the tenderness is parietal or intra abdominal the examiner's fingers as a rule will dip fairly deeply into the abdomen before tenderness is elicited. This deep position of the fingers has generally been regarded as proof that the tenderness is intra abdominal but in a surprisingly high percentage of cases this assumption will prove to be an error as shown

by the next step. (B) The examiner keeps his fingers at the most sensitive area he has discovered on deep pressure and requests the patient to make his abdominal muscles rigid by contracting his diaphragm or by raising and holding his head from the pillow, as the patient tenses his muscles, the examiner relaxes his finger pressure so that his fingers rise out of the abdomen and then with the patient's abdominal muscles tense the examiner reapplies pressure with his finger tips and he also may exert a little twisting motion with them. If the case under examination is one of intra abdominal tenderness only the B stage of test will fail to elicit any tenderness when strenuous pressure is applied over tense muscles. If the case is one of parietal tenderness almost or quite as much tenderness will be elicited by the B test as by the A test.

My clinical experience with this two stage test indicates that parietal neuralgia causes tenderness in all three sensory layers of the abdominal wall i.e. in (1) skin (2) muscles, and (3) peritoneum. Palpation by the A test with relaxed musculature elicits the combined tenderness of all three layers whereas palpation by the B test elicits tenderness only in the skin and muscles because thoroughly tense muscles protect the underlying sensitive peritoneum from painful pressure. With tense abdominal muscles it therefore happens that even when all the tenderness is in the parietes, the patient often notes distinctly less tenderness in the B test than in the A test.

With the A and B tests as part of the routine in abdominal examination I have been amazed at the frequency with which the tenderness is located in the parietes. Excluding cases of peritonitis I have found tenderness in the parietes more often than in the abdomen itself. In the absence of a complicating peritonitis the great majority of intra abdominal lesions are free from demonstrable tenderness. C. H. Mayo¹ has recently commented on the

of abdominal pain accompanied by nausea and vomiting coming on 4 or 5 times daily. The first attack was ushered in with severe pain in the epigastrium never by nausea or vomiting. The pain was sharp and gripping in character and intermittent and the patient thought she could see a tumor in her upper abdomen during the attack. Her bowels which had long been chronically constipated became obstinately constipated but were relieved by enemata. Never at any time did she notice any blood in the stool or on the stool. These abdominal attacks had increased in severity and for the past 10 days she had been confined to bed suffering considerable pain and without a bowel movement despite purgation. She had grown weak and toxic from loss of fluids and had lost 15 pounds in weight during this period. The character of the vomitus had never been fecal and had never contained blood although the odor was offensive.

Physical examination showed an emaciated acutely ill elderly lady with drawn face, anxious expression and flushed cheeks. The abdomen was hugely distended and a tumor mass occupying the epigastrium and right hypochondrium and extending down to the level of the ileum was visible. The abdominal musculature was poor and observation of the tumor readily disclosed peristaltic waves. Palpation showed the tumor to disappear under the left costal margin and traced it across the upper abdomen and down into the right iliac fossa. The tumor was doughy in feel and evidently contained large quantities of gas and fluid since gurgling was made out readily on movement. Over its entire extent the tumor was hyperresonant. Blood pressure was 110/60 pulse 100 temperature 98. The heart sounds were low pitched and weak and otherwise the physical examination was negative. The urine was acid in reaction, albumin one plus, sugar one plus, specific gravity 1002. Blood hemoglobin 70 per cent, erythrocytes 4,000,000, leucocytes 5,700.

Operation was performed September 9, 1925. A high left rectus incision disclosed the transverse colon and cæcum hugely dilated forming the palpable mass. An annular carcinoma high under the costal margin of the splenic flexure was palpated. Through a separate McBurney incision a caecostomy was done. It was noted at operation that the cæcum was thick and oedematous and that the semi-fluid content about half filled it while the remainder of the distention was due to gas. A large rubber tube about the size of the index finger was used in making the caecostomy. The patient reacted well, did not vomit again and made an uninterrupted recovery, gaining in strength and weight. The tube drained satisfactorily and was used to irrigate the cæcum daily after first 2 hours.

Secondary operation was done September 24, 1925. The abdomen was opened through the same left rectus incision as that used for exploration. The splenic flexure was mobilized and resected and end to end anastomosis was made between the

transverse colon and the descending arm. The Parker Kerr aseptic basting stitch method was used satisfactorily and the anastomosis completed without difficulty. The patient made a good recovery from the operation and was dismissed from the hospital at the end of another 2 weeks.

This type of operation in two stages perhaps represents the most satisfactory method of dealing with these acute obstructions of the colon. A justifiable criticism may perhaps be leveled at the surgeon for even exploring a weakened and devitalized patient suffering from malignant obstruction. Bevin and others have pointed out the advisability of merely relieving the immediate obstruction by a rapid caecostomy done under local or gas anesthesia through a McBurney incision and later carrying out the necessary examination to ascertain the underlying cause which may be dealt with as circumstances permit. The changes in the local condition of the bowel at the secondary operation are impressive and the lack of oedema and infiltration plus the general improvement in the physical condition emphasize the advantages of a graded procedure. In this particular location in the splenic flexure obstruction in either acute or chronic form is present in practically every case of carcinoma.

TREATMENT

The treatment of acute intestinal obstruction due to malignancy resolves itself into immediate relief of the obstructed bowel rather than technical maneuvers designed to deal with the underlying malignancy. The high mortality of obstruction is recognized as being a mortality of delay and as Van Beuren puts it, "The longer the patient with bowel obstruction lives before operation the sooner he dies after operation." Except in the 5 per cent of fulminating cases and in the acute cases due to volvulus, intussusception and strangulated hernia, diagnosis is more apt to be delayed in cases of colonic stenosis than in cases of small bowel obstruction. The time at which diagnosis is made influences the type of operation undertaken and the resulting mortality. The obvious diagnosis of strangulated hernia accounts for the difference in its favor in mortality when

intercostals and first lumbar. Very often tenderness is present over many more nerve trunks than would be indicated by the area of peripheral tenderness as shown by tests 1, 2 and 3. For instance the area of peripheral tenderness could be explained satisfactorily by involvement of the tenth and eleventh nerves only yet frequently unilateral or occasionally bilateral tenderness of nerve trunks may be found up to and including the first intercostal. This association of nerve trunk tenderness seems to have been entirely overlooked by the various writers on the visceroparietal reflex. It is a curious fact that intercostal nerves that exhibit tenderness of their nerve trunks and their abdominal terminal branches usually do not exhibit tenderness of their terminal branches which supply the chest wall itself. Exceptionally these chest terminals may be involved and then tenderness by tests 1, 2, and 3 may be found extending from midline in front to midline of the back over the chest as well as over the abdomen.

5 *By pinching flank muscles.* In certain thin individuals it is possible to demonstrate tenderness by picking up a fold of skin, fat and superficial layer of muscle in the flank (illocostal space at outer limit of abdomen) without encroaching on the underlying peritoneum even when tests 2 and 3 of the same area of skin and of skin and fat reveal normal sensation. In some instances this tenderness is diffuse in the muscles and it is then apparently due to hypersensitive nerve terminals. In other instances the tenderness is circumscribed and is apparently due to sensitiveness of the trunks of the twelfth intercostal and the abdominal branches of the first lumbar.

6 *By pressure over transverse processes of vertebrae.* Frequently when hyperaesthesia is absent in the skin and muscles overlying the vertebrae and tenderness of the spinous processes is also absent deep pressure will reveal tenderness of one or more transverse processes of the vertebrae. Usually the number of sensitive transverse processes is smaller than the number of tender nerve trunks. Occasionally a smaller number of less sensitive transverse processes is found on the opposite unaffected side. The cause of this tenderness is uncertain but I am inclined at present to re-

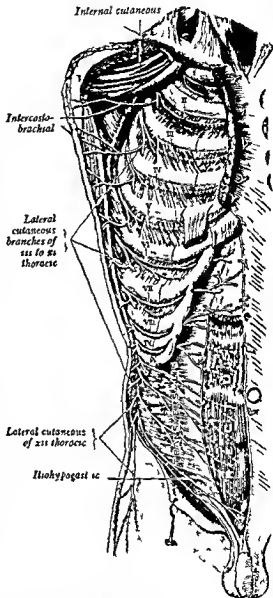


Fig. 1. Drawing showing intercostal nerves the superficial muscles having been removed. (From Lewis 10th ed. *Gray's Anatomy*.)

gard it as evidence of irritative lesions at the intervertebral foramina.

7 *By pressure over remote areas.* When the first and second intercostal nerves are affected, their large branches which run to the arm give rise to spontaneous pain or to tenderness or to both in the arm areas supplied by them. Involvement of these two and of other adjacent

LARYNGECTOMY IN ONE STAGE¹

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SINCE 1908 about 395 cases of laryngeal cancer have come under my observation 123 of which have been subjected to surgical treatment as follows: thyrotomy or laryngofissure 22 no deaths 15 recurrences 7 cures hemilaryngectomy 6 no deaths 4 recurrences, 2 cures total laryngectomy 95 2 deaths 15 recurrences

In 2 other cases in which death resulted from embolus and meningitis 3 and 8 weeks after operation the history is debatable. These cases are fully discussed elsewhere.

All deaths were in diabetics and syphilitic diabetics. There were none in patients with normal blood chemistry. It is most encouraging that in 57 frankly intrinsic cases there have been only 2 recurrences after total laryngectomy. The large recurrence in thyrotomy was due to faulty selection of operation and occurred in the cases treated between 7 and 15 years ago.

Hemilaryngectomy is an unjustifiable operation. Total laryngectomy has been gaining in favor over thyrotomy in recent years.

Operators are divided on the question of the best method for total laryngectomy between the one stage operation on one hand and the various multiple stage operations on the other. The merits of these methods cannot be discussed here. Personally I have always liked the one stage operation and feel that the results obtained justify this position.

I shall enumerate the principles governing the one stage operation.

The surgical principles involved are the following:

1. A careful study of the patient's general condition and of the metabolism especially as shown in the blood chemistry. Patients with pronounced and irremediable metabolic imbalance are rejected.

2. Digitalization just prior to the operation in all cases in which cardiovascular degeneration is suspected.

3. Careful dieting and colonic lavage for at least one week preceding the operation.

4. Mouth hygiene. All diseased teeth are extracted and diseased gums treated. Practically all mouths are unclean at the age when cancer occurs. The entire absence of teeth is a distinct advantage.

5. The combination of local and general anesthesia the latter not to exceed one half hour in time.

6. The absolute exclusion of blood from the trachea during operation and of wound drainage after operation.

7. The placement of wound drainage so as to block off extension of the infection into the planes of the neck and the special management of this drainage during the convalescent period.

8. The anchoring of the trachea in the lower angle of the wound and the corking of the trachea to exclude wound drainage during the entire convalescent period.

9. The use of suction for wound cleansing and for clearing the trachea of secretion. Inspissated secretions sometimes lodge at the tracheal bifurcation causing serious embarrassment to respiration. These should be removed with the bronchoscope.

10. The use of the naso-oesophageal feeding tube extending only half way down the oesophagus. This insures a liberal diet from the start.

11. After care. The dressing and care of the wound should be done by the surgeon himself and not by an assistant or staff doctor probably untrained in this work. All one's experience in the handling of infected wounds is required in forestalling a serious septic invasion.

I would call especial attention² to the high percentage of recurrence in all but total laryngectomies and to the recurrence of the disease in all the extrinsic and in many of the late apparently intrinsic cases. The great majority of laryngeal cancers are squamous celled and extremely malignant. Is the present conservative attitude toward laryngology

¹ Abstracted from article in *J. Laryng. & Otol.*, Edinburgh, 1934.

region or fracture of ribs endogenous toxins as from carious teeth infected tonsils upper respiratory tract infections pneumonia pulmonary tuberculosis intra abdominal foci of infection infectious diseases etc, exogenous toxins as lead alcohol arsenic anitoxins sero bacterines etc and various constitutional affections as anæmias blood dyscrasias syphilis diabetes etc Theoretically, an exhaustive painstaking examination should reveal evidence of the underlying disease causing the symptoms of intercostal neuralgia in every case In practice however it is often impossible to determine the definite cause and frequently two or more causes may be acting together in any given case

Intercostal neuralgia is more frequent in women than in men and more common on the right than on the left side and it may occur at any age In childhood and early adult life the common cause is toxæmia from contagious diseases pneumonia and upper respiratory tract infections and the attack usually persists for only a few days A more prolonged period of symptoms may result from Pott's disease or lateral curvature of the spine After the age of 25 or 30 years a greater variety of causes are noted

The symptoms of intercostal neuralgia may be transient or may persist over a period of years in which they may be fairly constant remittent or intermittent or may be subject to repeated exacerbations The severity of the pain varies greatly in different patients and often also in the same patient at different times Exceptionally in the acute cases pain may be so severe that heavy doses of morphine are required for its relief Usually the pain would be quite tolerable in the chronic cases except for its long duration Ordinarily the pain does not prevent the patient from working at his usual employment and his main reason for seeking advice is often due to a fear that the pain indicates some intra abdominal lesion such as appendicitis gall stones or cancer

When we consider that intercostal neuralgia may exist from only a few days up to several years, may vary in severity from 1 per cent mildness up to 100 per cent vicious severity of pain may involve any one or several of the

twenty four intercostal and the two first lumbar nerves and in addition other spinal nerves, and commonly may be associated with symptoms of its causative disease we can realize the great diversity in the clinical pictures presented by these patients

Intercostal neuralgia in so far as it affects the abdominal wall is commonly not recognized and is generally and erroneously regarded as an evidence either of an intra abdominal lesion or of some vague neurosis Abdominal tenderness due to intercostal neuralgia is usually not demonstrated by the customary method of palpation with relaxed muscles (A test) until the examiner's fingers have dipped more or less deeply into the abdomen Because of the deep position of his fingers the examiner subconsciously comes to the erroneous conclusion that the tenderness is deep seated and is caused by an intra abdominal, gynecological or genito urinary lesion Palpation by the B test with the abdominal muscles made tense would prevent this error and demonstrate the parietal location of the tenderness and then further examinations along the lines indicated would reveal additional evidences of intercostal neuralgia As a rule, the area of abdominal tenderness in intercostal neuralgia is too widespread to be accounted for on the basis of a lesion of a single viscus in the absence of a complicating peritonitis but this fact is commonly overlooked and failure to employ the B test is apt to result in an operation for a non-existent lesion in the viscus which lies immediately beneath the point of maximum parietal tenderness If the pain and tenderness are of recent origin and fairly severe they are often due to the toxæmia of a late stage of a respiratory tract infection which may still be causing fever tachycardia, and leucocytosis If as usually happens with intercostal neuralgia the pain and tenderness are right sided an emergency appendectomy may be performed on an appendix which does not show any present signs of active disease but the surgeon may theorize that it was linked or otherwise vaguely diseased to account for the acute symptoms The patient has a somewhat stormier convalescence than the ordinary clean appendectomy but inasmuch as his respiratory infection is past history, the

may predispose to a postoperative pneumothorax. Hence the advantage of laying bare the larynx and the first and second tracheal rings under local anesthesia before a general anesthetic is given. One per cent novocain is used for the preliminary anesthesia one-fourth to one-half of 1 per cent for the deeper structures during the operation. To this is added a very minute amount of adrenalin (10 drops).

The T incision is used. The dissection is carried backward until the larynx and trachea are skeletonized. When hemostasis is complete and all vessels tied, the patient is given a general anesthetic. The trachea is now cut across just below the cricoid or lower if need be, minute care being taken that no blood enters the lumen of the tube. It is an advantage to inject a few drops of a 10 per cent cocaine solution between two rings into the trachea before dividing it. This allays cough. The larynx is lifted forward and the posterior wall of the trachea is incised down to the esophageal wall. A rubber tube which fits snugly into the tracheal lumen is inserted into the trachea to a depth of about two inches. This acts as a tracheal extension, turns back the blood and enables the anesthetist to continue without being in the way.

The larynx is separated from the esophagus from below upward to a point behind the arytenoids. It is then allowed to fall back into position and the thyrohyoid membrane is divided so that it opens into the hypopharynx just below the attachment of the epiglottis. Before this is done the anesthetist or an assistant opens the mouth, sucks out all the secretion and paints the entire cavity, the pharynx and the hypopharynx with a 1:200 solution of acrifiolet. The nasal cavity is similarly treated. The edges of the opening in the thyrohyoid membrane are grasped and held apart. A yard of folded gauze 2 inches wide is stuffed into the hypopharynx and packed upward until it fills the hypopharynx, pharynx, and mouth. At this point a careful inspection is made of the growth. If it is found to be entirely intraluminal, the larynx is removed by cutting as close as possible to the superior border of the thyroid cartilage. The opening thus made in the

hypopharynx is small and lends itself better to successful repair. If the disease has approached the top of the laryngeal box or has involved the arytenoid, then more tissue is sacrificed even to the removal of the anterior hypopharyngeal wall adherent to the posterior surface of the larynx. In several cases 1 to 1½ inches of the anterior part of this wall have been taken away with the larynx without producing subsequent stricture.

Just before the last stitch is tied in the closure of the hypopharynx the anesthetist removes the gauze packing through the mouth. The pharynx and mouth are again cleansed by suction and painted with a solution of mercurchrome (2 per cent). A feeding tube of a size which will pass through the nose without undue pressure is introduced through the more open side. When its point appears in the esophagus beneath the untied stitch, the surgeon directs it into the esophagus to a depth of 6 or 8 inches. The point of exit from the nose is now carefully marked and the tube secured to the face.

The last stitch is now tied. If the redundancy of the tissue permits, a second layer of stitches is placed over the first in the hypopharyngeal closure. No plain gut is used.

The trachea is anchored to the skin of the neck by two or three mattress sutures each passed around a ring and brought out about 1 inch or more from the edge of the wound. These are tied on small perforated lead discs. This steadies the tracheal stump in the wound and relieves the strain upon the stitches which are to unite the skin edges with the mucous membrane of the trachea. These may be omitted if the trachea stands high in the wound. These stitches must be removed on the third day. To make this union more exact the fist under the skin at the wound edges is cut away. This allows the skin to fall more easily into relationship with the rim of the tracheal stump. The skin strip and rim of the trachea are united by interrupted stitches fine silk or better fine equestrene being used. The wound is loosely closed, no effort being made to bring the deeper parts into anatomical order. It is essential to get a primary union at one point—that is where the two lines of the T cross.

ulcer in which a dime sized area of tenderness is sometimes found near the midline in the epigastrium without other coincident signs of intercostal nerve lesion. Late peritonitis may also cause parietal tenderness limited to the abdomen and the tenderness may be present even when the muscles are tense in the B test but as a rule the nerve trunks buttocks and vertebrae are then not hypersensitive. These types of cases, however are rare as compared to the very common cases of widespread pain and tenderness due to intercostal neuralgia. I believe that further careful study of cases will demonstrate that (1) certain intra abdominal inflammatory lesions may cause parietal tenderness either by toxæmia or by involvement of the abdominal wall (2) the visceroparietal reflex is at most a very infrequent manifestation and (3) the usual cause of parietal pain and tenderness is intercostal neuralgia independent of an intra abdominal lesion.

In exceptional instances a suppurative intra abdominal lesion other than peritonitis may cause parietal neuralgia but it is then the result of a local manifestation of the constitutional toxæmia rather than the expression of a visceroparietal reflex and the chances are about equal that the parietal neuralgia will be on the side opposite to the suppurative lesion. I believe Mackenzie and his disciples have the cart before the horse when they assume that an intra abdominal lesion must be the cause of parietal pain and tenderness in every case. Acting on that assumption they operate to remove a chronic appendix or chronic gall bladder and because the microscope reveals chronic disease they regard their case as proven whereas a follow up on these cases all too commonly shows a recurrence of pain and tenderness after the patient resumes normal activities. The real test in these cases is not what the microscope shows but whether or not the operation relieved the patient of the parietal pain and tenderness for which he sought treatment. The majority of cases of intercostal neuralgia occur beyond midline at a time when various forms of intra abdominal pathology have made their appearance and can be demonstrated by exhaustive examinations or by exploratory opera-

tions, but the mere presence of such pathology does not prove it is the cause of the intercostal neuralgia. Cases are all too numerous in which repeated intra abdominal operations have failed to cure the neuralgia. Intercostal neuralgia and any intra abdominal lesion may coexist just as a wen of the scalp and an ingrown toenail may coexist in the same patient, and except for their geographical proximity they are usually just as independent of one another as regards cause, diagnosis, prognosis, treatment and ultimate results as are the wen and the toenail. In any case of intercostal neuralgia it may be a difficult question to determine whether or not there is a coexistent (although independent) intra abdominal lesion but a careful consideration of the history, symptoms, physical examination, X ray and laboratory findings will lead to a correct diagnosis.

Because of inadequate or misdirected examinations many patients with intercostal neuralgia are labeled neurotics or some similar opprobrious epithet just short of fakir or malingerer and receive but scant attention from physicians and hospitals. A large percentage of these patients are neurotic but that does not excuse the failure to diagnose and treat their intercostal neuralgias. On the other hand the failure to diagnose the cause of long standing abdominal pain and tenderness and the lack of interest shown in treatment are enough to make them "neurotic."

It is a surprising fact that patients with symptoms of long duration as a rule do not attempt to exaggerate their symptoms in the hope of securing more attentive treatment. That their pains are real is evidenced by their willingness to undergo operation after operation in the hope of obtaining relief from their prolonged pain and tenderness. In my experience nearly all the patients who have multiple abdominal scars and are still complaining of abdominal pain and tenderness present definite signs of intercostal neuralgia.

An examination of a patient along the lines indicated in the earlier part of this paper promptly substantiates the claims of the real sufferer and exposes the malingerer, because the latter's efforts soon reveal glaring discrepancies between his claims and the anatomical

metabolic rate iodine may therefore be said to be of great value as temporarily alleviating hyperthyroidism

There is no general agreement as to the value of digitalis in hyperthyroidism Harrison and Leonard (12) found that digitalis in full therapeutic doses decreases the output of the normal dog's heart by approximately 20 per cent. The following figures were obtained on two dogs with hyperthyroidism

Animal	C / output before treatment per min	C / output after treatment per min	Pulse before treatment	Pulse after treatment
Dog V70	3120	710	—14	+83
Dog V78	2602	2210	—12	+61

From these observations we may conclude that digitalis affects the heart in hyperthyroidism in the same manner as it affects the normal heart—though possibly to a somewhat lesser degree. Digitalis should be given to patients with hyperthyroidism whether cardiac insufficiency is present or not

In dogs the cardiac output did not return to normal for 60 to 90 days after the cessation of thyroid medication. There is doubt as to whether this fact is to be attributed to storage of thyroid substance in the body or to stimulation of the thyroid gland

SUMMARY

The effects of thyroidectomy and of the administration of thyroid substance on the cardiac output of dogs have been studied. The following results have been obtained:

1. The cardiac output is increased in hyperthyroidism and decreased in hypothyroidism. The change in cardiac output is usually somewhat greater than the change in metabolic rate.

2. The administration of iodine to animals receiving thyroid substance is followed by a marked decrease in cardiac output as well as in metabolic rate. This decrease continues for 6 to 10 days after which the cardiac output and metabolic rate increase rapidly.

3. The metabolic rate and cardiac output remain elevated for 2 months or longer after

the cessation of thyroid feeding. The former returns to normal before the latter.

4. Digitalis decreases the output of the heart of dogs with hyperthyroidism but this effect is somewhat less than the effect on the cardiac output of normal dogs.

5. The oxygen pressure and carbon dioxide pressure may be important factors in the regulation of the cardiac output.

6. Thyroid extract should be used with caution in myxedematous patients presenting evidence of cardiac weakness and withheld when cardiac decompensation supervenes.

7. Iodine therapy is valuable for a time in patients with hyperthyroidism, and especially so in patients with pronounced cardiac symptoms.

8. The prolonged administration of iodine is probably useless.

9. The administration of digitalis is indicated in hyperthyroidism.

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ulcer in which a dime sized area of tenderness is sometimes found near the midline in the epigastrium without other coincident signs of intercostal nerve lesion. Late peritonitis may also cause parietal tenderness limited to the abdomen and the tenderness may be present even when the muscles are tense in the B test but as a rule the nerve trunks, buttocks, and vertebrae are then not hyper-sensitive. These types of cases, however are rare as compared to the very common cases of widespread pain and tenderness due to intercostal neuralgia. I believe that further careful study of cases will demonstrate that (1) certain intra abdominal inflammatory lesions may cause parietal tenderness either by toxæmia or by involvement of the abdominal wall (2) the visceroparietal reflex is at most a very infrequent manifestation, and (3) the usual cause of parietal pain and tenderness is intercostal neuralgia independent of an intra abdominal lesion.

In exceptional instances a suppurative intra abdominal lesion other than peritonitis may cause parietal neuralgia but it is then the result of a local manifestation of the constitutional toxæmia rather than the expression of a visceroparietal reflex and the chances are about equal that the parietal neuralgia will be on the side opposite to the suppurative lesion. I believe Mackenzie and his disciples have the cart before the horse when they assume that an intra abdominal lesion must be the cause of parietal pain and tenderness in every case. Acting on that assumption they operate to remove a chronic appendix or chronic gall bladder and because the microscope reveals chronic disease they regard their case as proven whereas a follow up on these cases all too commonly shows a recurrence of pain and tenderness after the patient resumes normal activities. The real test in these cases is not what the microscope shows but whether or not the operation relieved the patient of the parietal pain and tenderness for which he sought treatment. The majority of cases of intercostal neuralgia occur beyond midlife at a time when various forms of intra abdominal pathology have made their appearance and can be demonstrated by exhaustive examinations or by exploratory opera-

tions but the mere presence of such pathology does not prove it is the cause of the intercostal neuralgia. Cases are all too numerous in which repeated intra abdominal operations have failed to cure the neuralgia. Intercostal neuralgia and any intra abdominal lesion may coexist just as a wen of the scalp and an ingrown toenail may coexist in the same patient, and except for their geographical proximity they are usually just as independent of one another as regards cause, diagnosis, prognosis, treatment and ultimate results, as are the wen and the toenail. In any case of intercostal neuralgia it may be a difficult question to determine whether or not there is a co-existent (although independent) intra abdominal lesion, but a careful consideration of the history, symptoms, physical examination, X ray and laboratory findings will lead to a correct diagnosis.

Because of inadequate or misdirected examinations many patients with intercostal neuralgia are labeled neurotics or some similar opprobrious epithet just short of fakir or malingerer and receive but scant attention from physicians and hospitals. A large percentage of these patients are neurotic but that does not excuse the failure to diagnose and treat their intercostal neuralgias. On the other hand the failure to diagnose the cause of long standing abdominal pain and tenderness and the lack of interest shown in treatment are enough to make them "neurotic."

It is a surprising fact that patients with symptoms of long duration as a rule do not attempt to exaggerate their symptoms in the hope of securing more attentive treatment. That their pains are real is evidenced by their willingness to undergo operation after operation in the hope of obtaining relief from their prolonged pain and tenderness. In my experience nearly all the patients who have multiple abdominal scars and are still complaining of abdominal pain and tenderness present definite signs of intercostal neuralgia.

An examination of a patient along the lines indicated in the earlier part of this paper promptly substantiates the claims of the real sufferer and exposes the malingerer because the latter's efforts soon reveal glaring discrepancies between his claims and the anatomical

has been correspondingly increased Erb's sign however, is more delicate than the others mentioned and in similar groups of cases reported from other sources the number of cases positive to Erb's exceeds those positive to Chvostek or Trouseau. In some of the cases definitely positive a fall in the blood calcium could be demonstrated but on the whole, there were no striking differences in the calcium levels in tetanic and non tetanic cases. Apparently, though sufficient parathyroid damage was done to cause an increase in the nervous excitability it was not sufficient grossly to disturb the calcium metabolism. This would appear to indicate that the calcium deficiency is one of the associated phenomena rather than the actual cause of tetany and that definite signs of tetany indicating relatively mild parathyroid insufficiency may be obtained without perceptible change in the calcium levels.

In many of our latent cases the tetany was transitory disappearing after a shorter or longer period. In 2 cases however symptoms became manifest and developed later into active tetany but fortunately were never of a severe grade. It is because of this ever present possibility that latent post operative tetany must be considered a condition of prime importance. These patients have apparently sufficient active parathyroid substance to meet ordinary demands but change of season, trauma, infection, menstruation, pregnancy or lactation may at any time provoke active tetany. In some cases the condition gradually becomes worse with out apparent exogenous cause the parathyroid damage apparently increasing as calcification progresses. Since it is impossible at the outset to predict the subsequent course it is extremely important that these latent cases be recognized and proper prophylaxis and treatment be instituted.

The phenomenon of latent tetany following operations on the thyroid gland was discussed by Melchior in 1922 (21). He called attention to the great number of hunger osteopathies immediately following the war in which there were skeletal diseases associated with deficient calcification. From their apparent relation to improper calcium metabolism

from the association of tetany and rickets in infancy, from the tendency in pregnancy to both tetany and osteomalacias and from the simultaneous increase in these bone diseases and in spontaneous infantile and adult tetany he reasoned that there was a heightened Tetaniebereitschaft 'a latent tetany, due to faulty calcium metabolism from poor nutritional conditions. In such a state many injuries which produce no effect on the normal nervous system may provoke manifest tetany. This is especially true in goutier operations where injury to the parathyroid is most apt to occur. To this fact he attributes the frequently observed increase in post operative tetany in the period shortly after the war. He first observed tetany in 2 cases which had remained latent for a number of months. In the first case the tetany was noted during the course of examination for re operation, in the second acute tetany suddenly developed 4 months after the operation and the patient died. On the strength of his theory and in view of these 2 cases he tested for latent tetany before and after operation in a series of thyroid and non thyroid cases (17). Non thyroid cases gave positive signs (Erb's Chvostek's) pre operatively in about 9 per cent of the cases and postoperatively in 30 per cent. Thyroid cases were positive after operation in at least 85 per cent of the cases (Chvostek 52 per cent). Melchior states that the incidence of tetany in different clinics depends on the method of examination and that the condition is usually diagnosed only in the severe manifest forms.

Syring (28) examined his thyroid cases before operation for evidences of parathyroid insufficiency. He found a surprising frequency of such manifestations as the positive Chvostek and Erb signs and evidences of old rickets etc. The signs were positive though unusually mild in 54.7 per cent of 53 men, and in 40.54 per cent of 74 women.

Jatrou (14) of the Eiselsberg clinic studied 71 goutier subjects before and after operation for Chvostek's phenomenon feeling that the other signs paralleled this one. Of the 71 cases 14 showed positive reactions before operation 23.32.4 per cent, showed positive reactions after operation.

THE INTRAVENOUS ADMINISTRATION OF MERCUROCHROME

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BEFORE one enters into the discussion of the therapeutic value of any drug or chemical not only a study should be made of the article to be employed but more particularly consideration should be given to the manner in which the supposed beneficial effects are to be obtained.

Experiments with dyes were undertaken partly because of the failure of hexamethylenamin (urotropin) to meet expectations as a urinary antiseptic. With the hope of making a compound of phenolsulphonephthalein which would act as a genito urinary germicide Dr. Hugh H. Young began his experiments and as a result mercurochrome 220 was evolved after much research. In this work Dr. Young was assisted not only by his associates at the Brady Urological Institute but also by numerous chemists and bacteriologists.

There can be no question of the thoroughness with which this work was done nor can anyone knowing Dr. Young doubt for one moment his sincerity but we do have the right to question whether his enthusiasm has not allowed him to attribute to this dye beneficial effects which are perhaps not results but merely coincidences. I am sure with this in mind Dr. Young has made a very earnest and tremendous effort to obtain reports from numerous sources both as regards the bad as well as the good results and to those of you who are particularly interested in such a collection of cases you will find a most comprehensive report of 213 cases in the *Archives of Surgery* May 1935. In the same article there is a description of the dye its history and other interesting data.

In considering the manner in which the supposed beneficial results are obtained it is first necessary to outline one's conception of septicæmia and this has been wonderfully done in a paper read before the American Surgical Association by Dr. Walter Martin and published in the September issue of *Annals of Surgery*. Naturally, in the con-

sideration of this many-sided problem, two questions promptly arise.

1 Does a blood stream infection spread in the same manner as does an infection in cellular tissue?

2 Is it possible to kill micro organisms with a dye or any other substance and at the same time not harm living cells?

In the answers to these questions will be found the justification or non justification for the continuation of intravenous medication.

It has been repeatedly demonstrated that if India ink, lamp black or any other inert substance be injected in the blood stream it will soon disappear from the peripheral circulation and may be found in localities in which the circulation is retarded as for instance in the capillary meshwork of the spleen, the liver and the bone marrow. (The dye is not excreted by urine or bowel.) In these localities the dye is taken up by cells of the reticulo endothelial system. These cells are known to have great phagocytic power as well as a reaction to certain vital stains. The relationship of these cells to antibody formation is most interestingly presented in an all too short article by Gay and Clark in the *Journal of the American Medical Association* October 25, 1924. Oppenheimer and Fishberg in the *Archives of Internal Medicine* November 1925 present a most instructive study of Leukemia and Reticulo Endothelial Apparatus. Martland, Conlon and Knief in the *Journal of the American Medical Association* December 5, 1925 demonstrate by means of an electroscope deposition of radio active elements in the phagocytic cells of the reticulo endothelial system in a paper the title of which is "Some Unrecognized Dangers in the Use and Handling of Radio-active Substances."

This however is neither the time nor the occasion for such speculation further than the statement that it is my belief that the solution of any problem in intravenous medication and sterilization will be most intimately concerned with these very cells.

but gently crushing their way through the tissues of the lower poles, so as to avoid the structures behind. An attempt was made to leave an estimated 2 to 5 grms of thyroid tissue. All of the patients made a complete recovery from the thyrotoxicosis.

A review of the histories presented by this group of cases places them all in the class of latent or extremely mild active tetany. In some cases the condition remained purely latent, never giving rise even to sensory symptoms and being manifested only by an increased tonus of the facial or skeletal muscles (Chvostek, Trousseau, Erb) which after a few days or weeks returned to normal with or without treatment. This group of cases is certainly overlooked unless routine examination for parathyroid insufficiency is made after all operations on the thyroid gland. These studies should be made before operation and repeated every day after operation for the first week or 10 days and periodically after that for several months. Only in this way can we determine the number of goiter subjects in whom we damage the parathyroid apparatus sufficiently to give rise to objective evidence at some time or other. The importance of this group lies in the fact that they may become manifest at a later time during pregnancy, menstruation, lactation or in the course of infections or metabolic diseases.

The next group of patients in the order of the severity of symptoms are those who have in addition to the objective signs mentioned above certain subjective symptoms of parathyroid insufficiency but without spontaneous muscular spasm. These symptoms are commonly paresthesia, numbness, tingling in the extremities, a sensation of hands and feet "going to sleep" and frequently a stiffness in the muscles of the face. When compression is applied to the arms or legs a spasm of the hand or foot is elicited (Trousseau's sign). Fatigue, languor and general mental depression are symptoms due to and frequently not ascribed to this condition. Two of the patients in this series had spontaneous cramps of the hands and feet which were promptly checked by treatment. These, however, should not be included in the group

of "latent" tetany cases. In one of these the symptoms persistently recurred. We have had no fatal cases.

The duration is seen to be extremely variable. Often the signs are very transitory, are found in one or two examinations then disappear never to be seen again. These signs would seem to be due to mild temporary derangements of the parathyroids from which the patient quickly and completely recovers. In other cases the signs remain for several weeks or months, during which time a certain amount of dietary and medical management may be necessary to keep the patient free from symptoms. After a lapse of the required interval during which injured tissues may recover, interrupted circulation be restored or the function of the damaged glandules be taken over by remaining or accessory bodies, all evidences of latent tetany may disappear. In a few instances the signs have persisted although the symptoms have gradually subsided. Apparently here there has been permanent injury to parathyroid bodies but the body adjusts itself so that no symptoms are produced under normal conditions of living even in the absence of all treatment. Should however circumstances arise demanding more than the usual parathyroid action the latent condition may become manifest and tetany occurs.

Prophylactic treatment of tetany is directed toward preventing operative injury to the parathyroids. When Kocher in 1883 first described *cachexia strumipriva* total extirpation of the thyroid was abandoned and less radical resections were substituted. The frequent recurrences however and the unsatisfactory cosmetic results led to more and more radical removals with a corresponding increase in tetany. In 1900 Cassile and Generali demonstrated that tetany was due to parathyroid insufficiency rather than to loss of thyroid and since that time many procedures have been suggested to spare these bodies. As early as 1889 Kocher advocated leaving the posterior layer of thyroid tissue and it has been a routine procedure with most surgeons since that time to leave the posterior capsule and a

fected serum. Four of these as well as the two controls which had received no streptococci were given mercurochrome at $\frac{1}{2}$ hour in intervals over a period of 10 hours until 5 milligrams had been given per kilogram of body weight. All of the rabbits receiving streptococci died within 24 hours. Those receiving the mercurochrome alone survived.

From these experiments it may be concluded that doses of mercurochrome exceeding 5 milligrams per kilogram body weight were fatal to rabbits; doses of 2.5 to 3 milligrams alone or repeated did not apparently affect the health of the animals.

In virulent streptococcus infections, mercurochrome whether given in massive doses or small repeated doses had little or no effect in checking or altering the course of the infection or in preventing its fatal termination. However Dr. Young reports in his clinical review of cases recovery in 9 out of 11 patients who had streptococcus hæmolyticus septicæmia and who were given mercurochrome 220. This would certainly tend to discredit our work on animals in which the blood stream had been infected with the same organism.

Because of the virulence of the streptococcus hæmolyticus and the rapid spread and fatal termination of infection produced by it it was decided to duplicate as closely as possible the above work with organisms of lower virulence.

A strain of staphylococcus aureus isolated from a blood stream infection in a child and a strain of bacillus coli isolated from human feces were the organisms selected. One two and three cubic centimeters of a 16 hour broth culture of staphylococcus aureus were injected in three series of 3 rabbits each as in the preceding experiment. These rabbits received no mercurochrome but the above amounts injected were not sufficient to cause death.

A similar series was injected with bacillus coli with similar results.

On account of the above results additional series were injected with 5 and 8 cubic centimeters respectively of the same aged culture of the staphylococcus aureus. The results indicated that this organism was not of suffi-

cient virulence for further use and for this reason the bacillus coli was used to complete the experiment.

By using 8 and 10 cubic centimeters of a 16 hour broth culture of bacillus coli with varying doses of mercurochrome as in the experiment with streptococcus hæmolyticus, it was found that in single doses mercurochrome had no apparent effect in checking the progress of the condition.

Repeated doses of 3 and 5 milligrams of mercurochrome per kilogram administered 4 hours after the injection of bacillus coli and the former repeated once 4 hours later seemed to indicate that this method of administration especially in 5 milligram doses was more efficacious than single doses in any of the amounts used.

Fractional doses of mercurochrome at 30 minute intervals beginning 4 hours after the injection of bacillus coli and continuing for 10 hours were now given in 5 series of rabbits. These animals received a total of 5, 7.5, 10, 15, and 20 milligrams respectively over the 10 hour period.

The results indicated that mercurochrome in this method of administration was more efficient in the larger doses than it was in what previously had been thought to be therapeutic doses for rabbits.

To prove that the deaths were not due to a foreign protein reaction a rabbit considerably smaller ($\frac{1}{6}$ kilogram) than those used in the balance of the experiment was injected with 8 cubic centimeters of sterile broth. This rabbit showed no ill effects whatsoever and appeared absolutely normal on autopsy.

From the second series of experiments it may be concluded that

1. Mercurochrome given in single doses of 2.5, 3 and 5 milligrams per kilogram 4 hours after the production of a colon septicæmia in rabbits seemed to have little apparent effect in checking the progress of the condition.

2. Mercurochrome given in 3 and 5 milligram doses per kilogram 4 hours after the production of a colon septicæmia and the dose repeated at the end of 8 hours seemed to check the progress of the condition in that the rabbits appearing to be very sick eventually recovered.

procedure have appeared. Certain inherent difficulties render the transplantation of parathyroid glands a rather inexpedient method, one to be reserved as a last resource.

The obtaining of material for transplantation is the greatest difficulty. Isotransplants in the hands of Borchers (1) Munroe (25) Floercken and Fritsche and others have given gratifying results. To obtain fresh human material is a matter of considerable difficulty. The deliberate removal of parathyroids from one person to implant in another strikes us as being unjustifiable and the use of glands from recent corpses or still born children is not always feasible. The further difficulty of recognizing parathyroid glands with certainty in the gross without microscopic control should also be mentioned. Isotransplants the immediate reimplantation of any parathyroid bodies found in the specimens removed at operation are advocated. Lahey (16) carefully examines every thyroid removed for such glandules and feels that their re-implantation is of considerable value.

Accepting the theory that the parathyroids constitute a part of the detoxicating apparatus and that tetany represents an intoxication from failure of this protective mechanism Dragstedt (4) has shown that the responsible poisons arise chiefly from the gastro intestinal tract. By eliminating proteolytic putrefaction in the colon he has been able to carry his animals along until they have recovered from the loss of their parathyroids. He employed a meat free diet gave an abundance of milk and prevented constipation. On the basis of this work and that of Luckhardt and of Retger and Cheplin we have developed a pre-operative and postoperative dietary regime which we employ routinely in all goster cases.

DIETARY REGIME¹

1. Patients are placed on a high caloric meat free or meat poor diet

2 Usually, they receive 1 000 cubic centimeters of milk and from 200 to 300 grams of lactose daily. This combination will change

Since submitting the paper I published we had good feedback from some what every group to the point that we had only those cases how evidence of a thyroid deficiency

the colon flora to that of an aciduric type in 3 to 4 days. The lactose is at times rather difficult to administer. It is given in various foods—ices, candy, ice cream, etc. It is also more readily given in wafers.

3 When the lactose tends to produce colic and diarrhoea chalk, kaolin or bismuth are added

4 When lactose is definitely objectionable to the patient the milk culture of the acidophilus organism 1000 cubic centimeters daily makes a perfect substitute and is pleasant to most patients.

5 Milk alone 1000 cubic centimeters daily in combination with a meat free or low meat diet is fairly satisfactory in accomplishing the same purpose

6 Carbohydrates other than lactose are given freely for their caloric value. None of these have any effect on the character of the intestinal flora, except dextrin which has value equal to lactose but is more difficult to administer.

7 Liquids are pushed Pitchers of water and fruit juices are kept constantly at the patient's bedside.

After operation the patient continues on the same regime until some days have elapsed when he gradually resumes his normal diet in the absence of signs of parathyroid damage. Should parathyroid damage become evident this dietary regime is maintained and further treatment is prescribed as follows:

The diet is made definitely meat free. Calcium lactate is given in 30 to 60 gram doses daily. Liquids are pushed to the extreme. Before the advent of Collip's parathormone in one patient whose symptoms reached the stage of some facial and carpopedal stiffness we administered water in 6 to 7 liter doses by means of a duodenal tube with relief within an hour or two on several occasions.

We have used Collip's parathormone in 3 of the cases listed with immediate relief in each instance. The dosage must be gauged to meet the severity of symptoms. By following the regime outlined above the need for parathormone could be entirely obviated in our cases, only one of which was of a severe grade. However its occasional use in 3 of our patients permitted a relaxation of the severity

men and one had twenty five bowel movements in one 24 hour period and many of these stools showed considerable blood. The last mentioned patient recovered. None of our cases was given over 5 milligrams of mercurochrome 220 to the kilogram of body weight. All 14 cases showed an increase in the amount of albuminuria and the number of casts after injections of mercurochrome 220.

Unfortunately there is no record in the hospital of the number of cases of blood stream infections which recovered without mercurochrome 220. This is due to the fact that until Dr. Young's report blood cultures were not generally made for up to that time no very definite attempt had been made toward blood stream sterilization.

There are three dangers to the intravenous use of mercurochrome 220. First and by far the greatest the overlooking in our zeal to try out the drug of something which should be done surgically such as the opening and draining of some secondary abscesses. This however should not be charged against the dye but is simply mentioned here because I have seen several such cases and this is unquestionably a distinct danger. Second the reaction following the intravenous administration of the dye. This might be sufficient to terminate the life of a patient already nearing an end though I have personally never seen a

case in which I thought this was true. It is probable that there are lesions produced in the liver and other viscera by mercurochrome 220 in addition to those due to the infection which are permanent and detrimental to the future health of the patient. Third and this too should not be added to the debit side of mercurochrome 220 the indiscriminate giving of the dye by physicians who are not in position to obtain blood cultures, etc. Certainly all intravenous medication has great potential dangers and should not be given except in well equipped hospitals.

Extremes are always dangerous and the middle ground is usually safe, and such I believe should be our attitude toward the giving of mercurochrome 220 intravenously.

Finally if I were asked to give my own personal view briefly, I would state:

Given a patient with a positive blood stream infection in whom all possible foci had been removed mercurochrome is worth a trial. At least it gives us one more thing to do in these otherwise hopeless cases and even if it is of no benefit to the patient this will often prove of some comfort to the family. I do not believe however that all the claims made for it as a blood stream sterilizer are as yet proved and mercurochrome like any other substance should not be put in a vein 'unadvisedly or lightly'.

negative Chvostek and Trousseau reaction Three weeks later 10 weeks after operation she first complained of tingling in her fingers and both Chvostek and Trousseau signs were positive Symptoms were present intermittently for 7 months always mild All symptoms and signs disappeared permanently at this time

CASE 4 Mrs A L W was operated upon for exophthalmic goiter The first subjective symptoms appeared 5 weeks after operation when the Chvostek and Trousseau signs were both present Both signs had been absent up to the time of leaving the hospital She became permanently free of symptoms after 4 months

CASE 5 N K age 30 was operated upon for toxic adenoma Mild tingling was irregularly present over a period of several months The Chvostek and Trousseau signs only occasionally present and always mild were permanently negative after 8 weeks

CASE 6 Mrs J C P age 33 had had right lobectomy elsewhere 10 years previously for simple cystic goiter and came to us because of adenoma of the left lobe with mildly toxic symptoms Examination revealed mild Chvostek and Trousseau signs

Following removal of the remaining lobe both Chvostek and Trousseau signs were present but appeared milder than before operation This patient at no time had any subjective symptoms The diminution in her reactions may be accounted for by the dietary regime on which she was placed

CASE 7 Mrs G D age 7 was re-operated upon for exophthalmic goiter for which a thyroidectomy had been done 2 years previously She had meanwhile passed through a pregnancy to full term and normal delivery The Chvostek and Trousseau signs were negative At re-operation because of persistence of toxic symptoms a maternal mass of thyroid tissue was found and removed

The Trousseau sign became positive and subjective tingling appeared within a few days All symptoms increased reaching a grade of moderate severity after 3 months She then reacted promptly to treatment but was not entirely free when last heard from This patient's symptoms were exaggerated during menstrual periods and materially so during an intercurrent respiratory infection

CASE 8 Miss E S age 20 operated upon for exophthalmic goiter had had fairly extensive X-ray therapy elsewhere Twenty four hours after operation the Chvostek Trousseau and Erb signs were distinctly positive and tingling in the face and extremities was marked Within 5 weeks all subjective symptoms and objective signs disappeared

CASE 9 Miss B K age 21 was operated upon for exophthalmic goiter No subjective symptoms appeared at any time Two days after operation all signs were negative On the seventh day the Chvostek sign became faintly positive the Trousseau sign negative—entirely negative 34 days after operation

CASE 10 H S a male age 36 was operated upon for exophthalmic goiter Tingling and objective signs became positive 24 hours after operation but entirely negative within 10 days

CASE 11 Mrs D S age 40 was operated upon for non toxic adenomatous goiter with retrosternal masses producing pressure symptoms No symptoms were present at any time The Chvostek and Trousseau signs were negative until the eighteenth day when the Chvostek sign became positive The Trousseau sign remained negative

CASE 12 Mrs F S age 40 had exophthalmic goiter She had been operated upon elsewhere 17 months previously a right hemithyroidectomy being done The hyperthyroidism persisted Examination was negative for the Chvostek and Trousseau signs A left hemithyroidectomy was done Twelve days later a mild but distinctly positive Trousseau reaction was obtained the Chvostek remaining negative

CASE 13 Mrs H F age 60 had toxic adenoma cholecystitis of long standing and mild hypertension Thyroidectomy was performed and 7 days later she complained of tingling in her fingers The Chvostek and Trousseau signs were positive Sensory disturbances were persistent and disturbing but never serious

CASE 14 Miss L K age 34 was operated upon for exophthalmic goiter No record is given of examination for the Chvostek or Trousseau sign until 10 weeks later when both were found to be distinctly positive The patient was entirely free of symptoms

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year a case of ileocaecal sarcoma producing acute obstruction by intussusception upon which I operated as an emergency under the impression that the pathological condition was due to an appendiceal abscess. Resection of the ileocaecal coil was followed by operative recovery, but a recurrence was noted at the end of 6 months.

The mechanical obstruction produced by carcinoma differs from that produced by sarcoma. Sarcoma arising in the lymph follicles of the bowel extends into the mucosa and other coats except the peritoneal covering by a progressive growth which is rarely perforative. Ulceration of the mucosa takes place late, although it occurs in a relatively high percentage of cases. The bowel proximal to the tumor is dilated because of the paralysis of the musculature from the direct invasion of the malignancy, and this dilatation rather than stenosis produces an intermittent obstruction which gradually becomes complete from external pressure. The reverse is true in carcinomatous invasion, the stenosis being produced by direct contraction of the bowel lumen from the signet ring type of growth. One in four carcinomata of the colon are of the annular variety encircling the bowel lumen. The high incidence of obstruction in the left colon is due to three factors: (a) the type of pathological growth, (b) the character of the normal physiological content of the distal colon and (c) the more constant fixity of the various divisions and the greater number of angulations which normally occur at the rectosigmoid junction, the junction of the sigmoid with the descending colon and at the splenic flexure. Normally there is a narrowing of the bowel lumen at these points which are held more or less rigid or semi rigid by the close fixation to the abdominal parietes. A sharp angulation is the rule at the splenic flexure and at the other points mentioned the mobility of the bowel above and below tends to increase the probability of obstruction. The content of the left colon is normally formed and hardened faeces while that of the right half around to the middle of the transverse segment is liquid or semi solid and easily passed by stenosis of considerable degree. The pathological characteristics of

growths in the two segments differ widely although adenocarcinoma is present in all colonic cancers. The encircling constricting annular variety occurs almost entirely distal to the transverse segment.

Two varieties of acute obstruction occur, one coming on unheralded out of a clear sky in 5 per cent of the cases according to Miller's statistics. The other which occurs in the larger group of cases represents the extension of the chronic process into a subacute obstruction and finally an acute complete stenosis. In the first variety premonitory symptoms are unusual and the attack is ushered in by fulminating symptoms demanding immediate relief. The second variety usually gives a history of several weeks of indefinite symptoms prior to the development of acute obstruction. Several rather acute attacks may have been passed through relief being obtained by the use of enemata and purgation. This indicates that a slow stenosis is taking place which gradually becomes subacute because the bowel contents cannot pass beyond the constriction with the result that traumatism to the mucosa has set up in an inflammatory reaction which causes a complete blocking.

The 4 cases of acute malignant obstruction which have come under my observation in the past 18 months and which I am presenting have been the result in 3 instances of carcinoma and in 1 instance of sarcoma. All represent malignancy of different segments of the colon and in each instance a different operative procedure was instituted. The 3 patients were young being 27, 30 and 31 years of age respectively. 1 patient was a woman of 60. The location of the growth was in the splenic flexure in one instance, at the junction of the descending colon with the sigmoid in another, in the central portion of the sigmoid in the third and in the ileocaecal coil in the sarcoma case. All patients were suffering from acute obstruction on admission. Of the 3 cases of carcinoma 1 represented an unheralded type of obstruction while 2 were typical of subacute stenosis suddenly becoming acute. In the sarcoma case the obstruction was an acute one due to intussusception. Three of the 4 made oper-

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end into the cæcum through the valve much after the manner of Brown's ileostomy used for ulcerative colitis. Anyone who has attempted to put a tube into a hugely distended cæcum which has been obstructed for some time has had the experience of finding the needle holes leak bowel content and the oedematous wet cæcal wall cut through by suture with such ease that it is impossible to make a proper closure and peritonitis is liable to ensue. The thick heavy small bowel wall however may be handled with much more facility and rarely I believe will this occur.

CASE 2 Mrs W I H age 30 female white married was a housewife. The family history showed the father and mother living and well, no brothers and no sisters. She had been married 7 years and had 3 children the youngest being 2 years of age. Menstruation began at 13 years of age, had been regular every 4 weeks from 4 to 5 days in duration with moderate pain and normal amount of flow. The past history, except for childhood diseases was negative. There had been no former operations. Present illness. Five days ago the patient developed suddenly symptoms of acute intestinal obstruction. She was seized with pain in the lower abdomen soon radiating throughout the whole abdomen and accompanied by nausea and vomiting. The bowels were not moved either by enemata or cathartics. She continued to pass gas however until 48 hours ago. Tenderness and rigidity of the abdomen increased but there was even on admission to the hospital only slight distention. Subsequent to operation no history of constipation or intestinal attacks could be elicited other than that she had had occasional mild attacks of indefinite abdominal symptoms referable to the stomach and relieved by home remedies.

Except for the abdomen the general physical examination was negative. The abdomen was slightly distended and symmetrical. There was moderate tenderness and muscular rigidity in all quadrants. On percussion uniform tympany was noted. There was an indefinite mass in lower quadrant apparently more in right side than in left.

Operation was performed immediately August 10 1925. Through a low incision the abdomen was opened and the colon was found to be distended throughout its entire length above a mass in the middle of the sigmoid flexure. The palpable mass made out prior to operation was a distended and loaded right colon. The obstruction was due to a malignancy encircling the bowel and completely stenosing it. The type of cancer was the signet ring variety and the growth occupied about 2 inches of the bowel wall. There were no demonstrable metastases. The growth was brought out through the incision as a Mikulicz Bruns procedure and the abdomen closed. Thirty hours subsequently a

cautery hole was made in the proximal loop of bowel and a catheter inserted. This relieved the gas distention immediately and the progress from this point on was uneventful. Six days later August 16 the second stage of the operation was completed and with cautery the tumor mass was severed.

The pathological diagnosis was adenocarcinoma.

The patient returned to her home in an adjoining state to wait for 3 months before having the colostomy closed.

Despite the favorable operative recovery in this case I deprecate the type of technical maneuver instituted. The operations of extensification have I think, a very limited field of usefulness in malignancy, and in acute obstruction due to malignancy I feel that their employment is distinctly contraindicated. Such a procedure accomplishes nothing toward the allaying of the symptoms and toxæmia in an acute obstruction which is the paramount issue in an emergency. To perform a Mikulicz Bruns operation in acute obstruction is but to multiply the hazards in an already desperate case. It is possible that this type of procedure may occasionally be advantageously employed as a supplement to a cæcostomy but even here I believe its employment is distinctly limited. It is a temptation always to bring out a loop of bowel which shows a cancer when it is freely movable and may be excised later without invading the peritoneal cavity but this temptation may be readily overcome by study of mortality statistics which prove that the supposed low death rate incident to this type of procedure is in error as regards immediate operative recovery while the end results are influenced in a markedly unfavorable manner by its institution.

CASE 3 Mrs J C B S age 60 female white married was a housewife. Her mother died of skin cancer at 75 the father died of senility at 79 a maternal uncle died of cancer. The patient had been married 36 years and had 2 children aged 35 and 32 there had been no miscarriages. The menopause occurred 12 years ago. The past history was unimportant except for typhoid fever and repeated attacks of tonsillitis. For several years she had had shortness of breath on exertion and occasional attacks of cardiac discomfort associated with weakness and dizziness. The complaint was general abdominal pain and intermittent vomiting for 6 weeks.

Present illness. For 6 weeks the patient had been more or less subacutely ill suffering with paroxysms



Fig 2 Very low power photomicrograph of a section near the periphery of the nodule. *A* Fibrous connective tissue. *B* *B1* Cystic spaces into which project masses of stroma containing glands. These are the pseudo glomeruli of von Recklinghausen or miniature uterine cavities of Cullen. Is it possible that they are masses of endometrial epithelium and stroma growing in and partly or wholly lining dilated lymph spaces? *C* *C1* Typical uterine gland seen in longitudinal and transverse section.

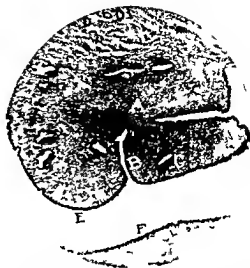


Fig 3 Photomicrograph of cyst with masses of stroma and gland seen at *B* in Figure 2. The cyst is lined throughout by a single layer of epithelium low cuboidal where it rests upon the fibrous tissue at *F* and high columnar where it rests upon the cellular tissue at *E*. Cilia have not been demonstrated in this cyst. Two glands whose lining is continuous with the covering epithelium of the mass dip into the cellular tissue or stroma. *A* One of these *B* shows partial branching of its distal end. A number of glands some of which are moderately dilated are seen in the cellular tissue *C* between it and the underlying fibrous tissue and in the fibrous tissue itself *D* and *D1*. The stroma is made up of cells which vary somewhat in size, are polygonal or roughly oval in form and possess rather large deeply staining nuclei. There is no evidence of inflammation in the stroma nor are any fragments of elastic fibers to be found. The capillaries of the stroma are distended and there are many large and small hemorrhages. Both glandular and stromal elements are identical with endometrium 10 to 14 days premenstrual stage.

In 1911 Sampson (25) reported 23 cases from his own practice in which he had found endometrial tissue in hemorrhagic ovarian cysts. In this report he put forward the theory that aberrant endometrial tissue found upon (or in) the ovary or elsewhere within the pelvis owes its origin to the implantation and growth of uterine epithelium which in a comparatively large number of women escapes together with menstrual blood from the fibrinated ends of the fallopian tubes. In succeeding communications (6, 27, 28, 29) he has elaborated this theory and at the present time it is accepted by many authorities as explaining the origin of intrapelvic endometrial adenomyomata, although some still prefer the older theories of embryonic and serosal origin. It may safely be said that the theory of endometrial implantation offers the most rational explanation of these growths and accounts for their location, the astonishing frequency of their occurrence and their morphological and functional identity with endometrium.

Although thanks to Sampson's writings we are beginning to recognize the frequent occurrence of what he called ectopic endometrial growths or implants within the pelvis extra pelvic growths containing endometrial tissue are decidedly uncommon. The following is one in which a nodule removed from the upper pole of the right labium majus proved to contain such tissue.

Mrs S (M G H 5101-24) aged 42 was admitted to the Montreal General Hospital complaining of a swelling in the right labium majus. Her menses began at the age of 13 years, were always regular every 28 days lasting 2 to 3 days with a moderate flow and very slight dysmenorrhea. Thirteen years ago at the age of 29 she had a miscarriage and since then she has had two full term children the

compared with other forms of acute intestinal obstruction. It is unessential to know the exact cause of acute intestinal obstruction before instituting treatment especially if the obstruction is of any length of standing. Even after the diagnosis of acute obstruction is arrived at occasionally it is not apparent whether the obstruction is in the ileum or in the large bowel, and even if obstruction is present whether exploration should be made.

Physical examination of the distended abdomen, plus a careful history usually indicates the type, nature and location of the obstruction. If the ileocecal valve remains competent and does not permit back flow of the intestinal content into the small bowel, usually tumefaction, peristalsis and outline of the colon indicates the position of the stenosis.

In 2 of our cases the tumor was entirely in the right side and on examination was found to be in the caecum and ascending colon while the obstruction was located in 1 case at the splenic flexure and in another at the junction of the descending colon with the sigmoid. As Mr Burgess aptly remarks:

The keynote to the diagnosis is the condition of the caecum. If it is visibly distended or failing this if it can be definitely felt to alternately soften and harden under the examining finger, then the obstruction is distal to it.

When the abdomen is opened the condition of the ileocecal coil indicates the location of the obstruction. Whether or not exploration or simple drainage should be undertaken I believe can be answered by the individualization of cases and institution of exploration in those whose general condition seems to warrant it. Mortality statistics indicate clearly that major operative procedures are distinctly contra-indicated. Primary resection in the face of acute obstruction has an excessively high mortality and is not to be considered favorably in the treatment of this condition. An 85 per cent mortality in resection of the colon for acute obstruction due to malignancy (exclusive of the ileocecal coil) regardless of the type of technique employed, is prohibitive. Enterocolostomy, colostomy and enterostomy, are types of operation to

be considered with or without exploration. Apparently caecostomy alone without exploration is the operation of choice in the majority of instances. A blind caecostomy may result in a volvulus or internal strangulation being overlooked in a small percentage of cases, but Burgess assumes that the increased mortality from overlooked gangrenous intestine is only 15 per cent. Caecostomy has advantages over the other types of operation both as an emergency measure and as a primary step of a graded operation, even in chronically obstructed cases. It permits drainage of the bowel and at the same time may be used as an avenue of medication to reduce the local inflammatory conditions against the time of subsequent resection. It is placed further from the field of secondary operation than is colostomy, and usually requires little or no effort to close after the secondary resection has been carried out.

The Gibson technique we have found satisfactory both because it can be used in emergencies and because it usually closes spontaneously or by a minor maneuver. Through a split muscle incision under local anaesthesia or local and gas the caecum may be rapidly delivered, a large tube placed in it and immediately siphoned into a bottle at the bedside is commenced.

In acute obstruction of the colon the mortality is more than 30 per cent from a simple maneuver alone and the percentage rises in direct ratio to the increase in magnitude of the operative procedure and the delay in diagnosis. The acute crisis being past roentgenography indicates the location of the growth and its extirpation may be undertaken safely at a second stage when the general and local conditions have been improved.

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Fig. 6 A very low power photomicrograph which shows a small part of one end of the large cyst in the fibrous nodule together with adjacent smaller cysts. *A* Part of large cyst. *B* lining of flat epithelial cells lying directly on fibrous tissue. *C* columnar epithelium overlying the stroma in the wall of the cyst at *D*. *E* a smaller cyst lying near the large cyst. *F* projecting tongue of stroma covered by columnar epithelium. *G* large mass of stroma of very typical uterine character covered by high columnar epithelium and containing dilated glands lined by a similar epithelium. *H* dilated epithelium in the lining of a small cyst.

provides a supporting framework for the larger masses. They are made up of cells which vary somewhat in size, are oval or polygonal in form and stain deeply. In many of the projecting masses glands are seen dipping down from their free surfaces. These glands are lined by a single layer of high columnar cells which is continuous with the epithelial covering of the mass. For the most part



Fig. 8 Drawing of an oil immersion field showing cilia upon the epithelium lining a small cyst which lies near the large cyst, a part of which is seen at *H* in Figure 6.



Fig. 7 A low power photomicrograph of the field shown at *G* in Figure 6. It shows very beautifully the typically uterine character of the stroma and the high columnar epithelium covering it. In it are two irregularly dilated glands. No cilia are seen in the epithelium here.

they are straight tubular glands but a few tend to branch at their distal extremities. Other glands are seen in cross section and some of these are of normal uterine character while others are more or less dilated. In the cellular tissue or stroma about the glands recent hæmorrhage may be seen which in some places has involved the gland lumens.

From the foregoing description and a reference to the figures it will be seen that the tissue of the projecting masses in both its glandular and stromal elements appears to be identical with endometrium in an early premenstrual stage. In view of the fact that the patient was operated upon two days before she should have menstruated one would expect to find premenstrual congestion or hæmorrhages in this tissue if it be endometrium as it appears to be. If a comparison be made between this tissue and the endometrium which invades the wall of the uterus in adenoma diffusum benignum the identity of structure is most striking. (For a further description see legend under Figs. 3, 4, and 5.)

The greater part of the circumference of the large cyst is lined by a rather thick wall, the outer layers of which are made up of dense fibrous tissue. Near to the lumen of the cyst the fibrous tissue cells are less mature and white blood cells are caught in the meshes. The inner layer of the cyst wall is for the greater part very irregular in outline and is made up of young fibroblasts, white blood cells, plasma cells and endothelial leucocytes. The plasma cells and endothelial leucocytes contain granules of brownish pigment, some being completely filled with the pigment granules which are taken to be blood.

justifiable in view of this fact and of the extremely radical position adopted in general surgery toward cancer? Does it seem logical to expect results from a partial operation in which only an apparently normal rim of tissue 0.5 centimeters wide separates the surgeon's knife from the disease? I say apparently since the cases cited in a former paper show how fallacious may be our pre-operative judgment on this point.

The diagnosis should be made on the history, appearance and the situation of the growth and on the exclusion of syphilis and tuberculosis. Biopsy is robbing us of our powers of observation and is as open to criticism here as it is in general surgery where it is resorted to only in exceptional circumstances. I have been forced to employ it in only a few instances in 122 cases.

The extent of the growth should not be estimated on the image seen by direct or in direct laryngoscopy since the upper edge is all that appears for inspection. It would seem quite safe to add two thirds to what is visible in forming a mental picture of its size.

Formerly when in doubt as to the extent of the disease I advocated opening the larynx for better orientation. I now believe that this should be avoided since the incision may bisect the growth and disseminate it. Further more this procedure may let blood into the trachea and if it must be followed by a total laryngectomy the time consumed adds materially to an already serious and dangerous operation. If doubt exists in the operator's mind the patient should be given the benefit of that doubt by having the more radical operation done.

It is my conviction that only the most incipient cancers should be treated by any method other than the most radical and we must always bear in mind that we have but one operative chance to cure the disease. Secondary operations have at least in my hands been a failure.

OPERATIVE PERIOD AND TECHNIQUE

The surgical period may be divided into three stages (1) the preparation (2) the operation (3) the after treatment.

1 *The preparation* The 2 deaths noted in the above series were due to faulty metabolism. One patient was an obvious diabetic the other gave a history of glycosuria for a short period 2 years prior to consulting me. After operation the tissue reaction suggested diabetes and this was confirmed by the finding of a high percentage of sugar in the blood. The lesson learned from this experience leads to the first point in the period of preparation. A metabolist determines the patient's chemical status and if the metabolism is faulty he makes an effort to rectify it. If a metabolic balance cannot be established especially if the blood sugar cannot be brought to a safe limit operation is refused.

Cardiovascular degeneration if not too advanced does not contra indicate operation. The exhibition of digitalis may be of great value and if employed should be completed just before the operation. Special attention is paid to the condition of the digestive tract and particularly the colon. During the week preceding the operation three colon irrigations are given at two day intervals. The first one is preceded by castor oil. This should be thoroughly done so that the patient arrives at the operation with a clean colon. During this week a diet low in protein (excluding eggs and sweet milk) is advocated.

All canous and pyorrhoeal teeth are extracted and the remaining ones cleaned. Entire absence of teeth augments the prospect of primary union or at least of lesser degree of infection. Morphine grain $\frac{1}{4}$ and atropine grain $\frac{1}{200}$ are given hypodermically 1 hour before the operation.

2 *The operation* A combination of local and general anesthesia is in my opinion better than one of these alone. By this method the duration of the general anesthesia is reduced to one half hour an important factor in the resistance of the patient.

If the growth encroaches upon the breathway the administration of general anesthesia from the start may increase the embarrassment and necessitate a tracheal opening before the surgeon is ready. If the patient becomes cyanosed and is not promptly relieved the consequent lung hyperemia

same patient. It was of the same structure as the first and lay just above the pubes on the left side and was attached to the left round ligament.

It will be seen that the case here reported differs from Cullen's case in only three particulars: first, it contains a relatively large cyst evidently derived from a miniature uterine cavity though its epithelial and stromal lining have been largely destroyed by repeated menstrual bleeding and the resulting distention (26); second it is not connected in any way with the round ligament and third the endometrial tissue lies in a nodule of fibrous tissue.

In 1898 von Recklinghausen described a case in which an 'adenomyoma' was found in the base of the right labium majus attached to the hypertrophic round ligament. Arguing from the developmental connection of the round ligament with the wolffian body, he used this case as a proof of the origin of ectopic endometrium like tissue from remnants of the wolffian body.

F. Weber (39) described a tumor the size of a hen's egg situated at the left external ring and attached to the round ligament. It contained tissue resembling endometrium and he thought that the epithelial elements arose from the endothelium of dilated lymph vessels.

Pfannenstiel's (23) case illustrated the intracanalicular variety of round ligament adenomyomata. An unmarried woman 39 years of age complained of swelling in the right inguinal region. On examination a second nodule was found in the wall of the vagina. At operation a nodule the size of a walnut was removed from the inguinal canal just within the external ring and the vaginal nodule was also removed. Both proved to contain many glands of uterine type and a few pseudoglomeruli. Pfannenstiel regarded both nodules as being of muellerian origin.

Blumer's (1) patient was a woman 47 years of age who had noticed for 22 years the presence of two small nodules in the right groin. These grew slowly and became fused but in the last 6 months underwent a rapid increase in size. At operation a mass the size

of a hen's egg was removed from the right abdominal wall, midway between the internal and external rings and a little external to the inguinal canal. It was not attached to the round ligament. It was made up of interlacing bands of smooth muscle fibers and in one section only glands and cysts were found. The glands were lined by a columnar epithelium in some places ciliated which lay directly upon the muscle fibers. There was no stroma. The cysts had an incomplete lining of columnar epithelium. It was thought that the tumor might have originated in the inguinal canal from muellerian rests.

The following cases illustrate the intraperitoneal occurrence of these growths. Martin (20) reports the case of a woman aged 71 who had a rapidly growing pelvic tumor. He removed a large cyst containing chocolate colored fluid. It was attached to the left round ligament by a pedicle which contained small cysts with clear contents, one of which was lined with columnar epithelium. Cullen considers this case as being probably an adenomyoma of the round ligament but Gottschalk and Schramm (13) believed that it and a similar case of Schramm's were to be regarded as telangiectatic.

Semmelink and de Josselin de Jong (35) in 1904 reported a case in which all the pelvic organs except the fallopian tubes were infiltrated by endometrium like tissue. An adenomyoma containing a cyst lined with tissue resembling endometrium arose from the right round ligament and the authors concluded that upon topographical grounds it must be of wolffian origin—a conclusion with which Lockyer (19 pp 317-318) appears to agree.

The cases cited are illustrative of a type of growth be it tumor the product of inflammation of epithelial or endothelial metaplasia or of transplantation which situated in more or less intimate relationship with the round ligament agrees with the others in the possession of epithelial and in the majority of stromal elements not to be differentiated from the lining of the uterine cavity. The tumors have this feature in common with the whole group of aberrant or ectopic endometrial growths wherever found. There has been

I have observed that if the integrity of this part of the wound can be maintained the subsequent healing is much more rapid and a hypopharyngeal fistula does not form. If a break occurs at this point or if the wound has to be entirely opened to secure better drainage, an effort should be made as early as seems prudent to bring back the angles of the T into place.

I am convinced that an apparently negligible amount of blood entering the lungs during the operation may cause serious consequences. It is therefore my endeavor to conduct the operation so that not one drop is allowed to pass down the trachea. A double suction outfit in the hands of the assistants and meticulous vigilance on the part of all secure this result. The rubber tracheal extension tubes are in five sizes from which one may always be selected which will closely fit the lumen of the trachea.

Since I have put behind me the ambition of securing primary union and have abandoned the usual surgical methods of wound closure with scanty drainage my postoperative troubles have been materially reduced. Great care in closing the hypopharynx is essential but more essential to the life of the patient is a loose closure with abundant drainage of the superimposed tissues of the neck.

Septic infection must be forestalled by placing drainage in its path. My experience has led me to employ 4 small double tube drains wrapped in gauze. The tubes are open only at their distal and proximal ends. One pair is placed in each of the deep pockets at the end of the cross bar of the T. One is laid on each side just above the tracheal skin union and extends laterally to the full depth of the wound. They are left *in situ* for 5 or 6 days and kept clean and open by forcing water through one tube and sucking it out through the other. Then one tube is clamped and the salt solution forced out along the gauze about the tubes. Thus both gauze and tubes are cleansed. This is done 2 or 3 times a day.

A large tracheal cannula (36) is wound round with gauze impregnated with bismuth paste. The winding is so fashioned as to form

a conical cork. This is inserted into the trachea and should fit it as a cork does a bottle. The object of corking the trachea is to prevent tracheal secretions from contaminating the wound and wound secretions from entering the trachea. It also protects the tracheal skin union. In my hands it has been a very serviceable device especially later when infection occurs and discharge from the wound becomes profuse. Without tracheal plugging in the latter condition lung infection would be almost inevitable. The corking is maintained until healing is complete. The wound is dressed in the usual way. A rubber apron is placed over the end of the cannula to catch the tracheal secretions.

During the repair period of the operation the patient is given little or no anæsthetic. General anæsthesia is imperative only from the time the trachea is opened until the hypopharynx and œsophagus are closed.

3. *After treatment.* The immediate treatment usual after any major operation is carried out. I will speak only of the conditions peculiar to this operation. It is here that the skill and experience of the surgeon are often taxed to and even beyond the limit. The after treatment in laryngectomy cannot be delegated to an assistant or a member of the house staff. Painstaking constant care on the part of the surgeon is the only key to success. If infection occurs the surgeon must be at least one step ahead of it. I attribute the prohibitive surgical mortality of a few years ago and even more recently to four causes: viz. careless preparation of the patient, prolonged general anæsthesia, the entrance of blood into the lungs during the operation, and mismanagement of the septic infection so common after operation. Another factor may be added. Rectal feeding and drop feeding by the mouth were depended upon prior to my demonstration many years ago that the œsophagus would tolerate a permanent tube for weeks. Rectal feeding was one of the greatest fallacies that ever became rooted in the professional mind.

The drains are left in position if possible from 5 to 7 days. If they are removed sooner their replacement becomes almost impossible on account of the œdema of the neck. About

The uterine lymphatics afford another route by which endometrial cells may reach any part of the round ligament. The endometrium is devoid of lymph vessels but is richly supplied with lymph spaces which drain through more definite intramural lymph vessels into a subperitoneal lymphatic plexus which is especially rich upon the posterior surface of the uterus. A part of the uterine lymphatics is drained via those of the round ligament into the superficial inguinal glands; therefore it is quite possible that epithelial and stromal cells set free during menstruation or after delivery or curettage may find their way into the lymph spaces of the endometrium, and 'metastasize' by way of the lymphatics in any part of the round ligament including its attachments in the upper pole of the labium majus.

In any case the distribution of ectopic endometrial growths closely resembles that of the metastases of uterine and ovarian carcinoma which originate by transplantation or vascular transportation and it is logical to assume that endometrial growths may have their origin in exactly the same ways. The endometrium is never stationary; it is constantly being destroyed and repaired in its destruction a portal of entry is opened up by which its cells may reach either lymphatic or venous channels in the uterine wall and there is no reason to doubt that it frequently enters these channels and in some cases leads to "metastases" at a distance. Simpson has demonstrated endometrial implantation and has collected considerable evidence to prove the vascular spread of endometrial cells (32, 33). The writer has recently seen in his (Simpson's) laboratory a vessel either a small vein or a lymphatic in the uterine wall which contains within its lumen the cross section of a typical uterine gland surrounded by uterine stroma.

It is the writer's opinion that the case here reported owes its origin either to transplantation of endometrial cells into the tissues of the labium majus as a result of injuries received during childbirth or their vascular (lymphatic or venous) dissemination; more probably the latter. Of the two vascular channels the lymphatic offers the more direct

communication between the uterus and the labium majus but the possibility of dissemination through the veins and subsequent growth, cannot be ruled out.

Since the above was written the patient (M. G. H. 5701-24) returned to the hospital 18 months after her first operation. About 3 months after leaving the hospital she had noticed a small lump in the upper end of the scar. This slowly grew in size and became swollen and very painful and tender at the menses. The pain began about 1 day before the flow commenced and lasted from 10 to 14 days after it had ceased. On examination about 4 days before menstruation a slight fullness and increased firmness of the tissues of the upper extremity of the right labium majus and right half of the mons veneris was observed. Operation was delayed until menstruation was well established when the parts referred to presented a marked swelling which was extremely painful and tender. At operation the mass was found to overlie the deep fascia without infiltrating it and to extend from the midline overlying the symphysis outward to the external abdominal ring and downward into the labium majus. The distal end of the round ligament was included in the mass and was cut just above where it emerged from the external abdominal ring and removed with it. The specimen removed measured 4.5 by 3 by 2.5 centimeters and consisted of firm nodular tissue embedded in fat from which it could not be shelled out. There was no evidence of a capsule. The cut surface showed many interlacing bands of firm greyish yellow tissue enclosing in their meshes small islands of deeply hemorrhagic tissue and minute cysts whose contents were thin chocolate-colored fluid. Deposits of yellow or amber-colored pigment were scattered throughout the tissue. Sections show many small islands of endometrial tissue embedded in a dense fibrous matrix. Both glands and stroma are intensely hemorrhagic and present the typical picture of menstruating endometrium.

Although nothing further has been learned as to the origin of the endometrium in this case the finding of actively menstruating endometrial elements confirms the previous diagnosis. The finding of the round ligament involved in the aberrant endometrium lends weight to the theory that it took origin by lymphatic metastasis; alone, the lymph vessels of the ligament. Had it been possible to examine the pelvic organs and peritoneum further information might have been gained. Ordinary bimanual examination did not reveal any intrapelvic disease.

ST. MARK

Ectopic endometrial growths in the labium majus have been regarded as adenomyomata of the round ligament and their origin assigned to (1) wolffian or muellerian rests

LATENT POSTOPERATIVE TETANY

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POSTOPERATIVE tetany is usually thought of as one of the infrequent complications following thyroidectomy, and its occurrence is so rare that only isolated reports are to be found in the literature. Von Eiselsberg (9) states that in 2,588 goiter operations he has had 6 fatal cases of tetany, 8 severe ones and about 24 which he calls 'mild' a total incidence of slightly more than 1 per cent. A review of the literature (24) relative to the frequency of postoperative tetany reported from the various clinics discloses figures ranging from 0.2 to 3.4 per cent, the average incidence being about 1.4 per cent. Lahey (15) states that in 500 thyroid operations prior to 1911 he had no cases of tetany, in 34 operations during 1921 there were 2, and in 18 operations during the first part of 1922 he had 1 case. In 2203 operations on the thyroid gland De Quervain (3) reports no case of outspoken tetany and but 3 cases of mild functional parathyroid disturbance. The statistics for our clinic were in accord with those of the other groups cited. We have examined records of 174 thyroidectomies performed prior to September 1, 1924, and found but 2 cases of postoperative tetany, an incidence of 1.15 per cent, which compares favorably with the incidence mentioned above.

In September 1924 a patient with exophthalmic goiter was operated upon rather complete resection was done, only a very small amount of thyroid tissue being left behind. She had very little postoperative reaction. On the day following the operation she complained of some tingling in her left hand and examination revealed Chvostek's and Trousseau's signs to be positive. Another post-thyroidectomy patient in the hospital at the same time who complained of no symptoms whatsoever was also tested for evidence of parathyroid insufficiency and in her case

too both Chvostek and Trousseau tests were positive. Both patients apparently had relative parathyroid deficiency yet neither displayed the usual manifest symptoms of tetany. Mild subjective symptoms were present in the first case, none whatever in the second. Both were truly latent so far as spastic phenomena were concerned. Since that time all goiter subjects have been examined before and after operation for similar manifestations and a surprising number showing positive results have been observed.

For the purpose of this study we have examined 100 consecutive cases operated upon for goiter beginning with the cases mentioned above. Fourteen of these showed evidence of latent tetany as measured by the presence of a positive Chvostek or Trousseau reaction, or both. The incidence in the various types of goiter was as follows:

	Positive reaction	Percentage
66 exophthalmic goiters	10	15
25 toxic adenomata	3	12
9 non toxic goiters (adenomata etc.)	1	11

Signs of parathyroid insufficiency were frequently found to be transitory and varied greatly in their time of onset. Many patients were examined but once and this examination was made at varying intervals after the operation. Undoubtedly had our observations been made with greater regularity and repeated more often the number showing signs of latent tetany would have been materially increased. Our studies included examination for Chvostek's and Trousseau's signs and blood calcium determinations. In a few cases, the electrical excitability was measured according to Erb. In a general way where Chvostek's and Trousseau's signs have been present the electrical irritability

VARIATIONS IN THE PROGNOSIS OF ENDOMETRIAL CARCINOMA AS INDICATED BY THE HISTOLOGICAL STRUCTURE¹

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THE body of the uterus is affected in but a small fraction usually estimated at about 10 per cent of all cases of cancer of this organ. In general it may be said that cancer of the body is a glandular carcinoma while cervical cancer is epidermoid. This statement, however, is not absolute. Glandular carcinoma occurs not infrequently in the cervix and epidermoid cancer is found, though but rarely in the fundus.

There is a tendency to regard carcinoma of the body of the uterus as a clinical entity and to give a prognosis and to carry out treatment on this basis. The duration of symptoms, the possibility of extension of the disease into the parametrium, metastases and the general condition of the patient are carefully taken into account but once the diagnosis of cancer has been verified in the laboratory little or no interest is taken in the histological findings. This neglect is shared by the pathological and gynecological textbooks many of which though they give a histological classification fail to point out its important bearing on the conduct and outcome of the case. As a result the disease is generally regarded and treated as one of uniform type.

This belief has persisted in spite of the fact that it is contrary to both surgical and pathological experience. It has long been known that in certain cases curettage may show undoubted cancer and yet with no other treatment the patient has remained well and shown no further evidence of the disease. Ladinsky (7) has collected 22 such cases and many others are found in the literature. In contrast with this and in spite of an immediate operation in which the most complete removal is carried out many cases quickly show recurrence and end in the death of the patient. On the pathological side is a similar variation. At one extreme are cases in which the departure from the normal is so slight that the diagnosis actually may be in doubt. At the other the

picture is that of a rapidly growing infiltrating highly malignant tumor. As a result of the merging in a single group of the relatively benign and the highly malignant, an entirely false conception of fundus carcinoma has developed and the more malignant forms are treated with a leniency unwarranted by the facts. Also many patients with the more benign forms are subjected to a severe operation which would appear to be unnecessary.

The object of this investigation, therefore, was to make an attempt to correlate the pathological findings with the subsequent history of the case and so to evolve a practical classification which would be of value both to the pathologist and to the clinician and would indicate to the latter the probable course to be anticipated in any particular case. Unless such information followed, a purely histological classification would have little practical value.

Such attempts at classification are by no means a recent development. Selberg (11) reviews the early work and ascribes the first mention of adenoma malignum to Gussertow (3) in 1870. Five years later Olshausen (10) described this condition and advised its definite separation from adenocarcinoma. Opposition to this separation was voiced by Kaufmann (5) but Selberg after reviewing Kaufmann's evidence came to the conclusion that he had wrongly classified the material on which he based his objections. Selberg described the typical appearance of adenoma malignum and showed that it was definitely malignant invading surrounding tissues ulcerating and producing metastases. He affirmed his belief in the validity of the separation. In the same year 1900 von Hansemann (4) appeared in opposition and while he admitted the convenience of the term he came to the conclusion that adenoma malignum differs in no way from carcinoma and does not deserve to be elevated to a special class. He also

In a recent article, Steichele and Schlosser (27) were unable to confirm the findings reported above. One hundred patients were studied before and after operation. They concluded there was no predisposition to tetany before operation and that postoperatively there was no "latent" tetany in cases without manifest tetany.

We have been able to demonstrate positive Chvostek or Trousseau signs before operation in a few cases but the percentage of positives is not nearly as great as those cited above. Of the patients studied, pre operative parathyroid insufficiency was seen in 3. Of these 1 had been operated upon elsewhere 11 years before unilateral lobectomy having been done. She was unable to recall ever having had any symptoms suggestive of tetany. When she presented herself to us because of an adenoma of the opposite side which was causing toxic manifestations both the Chvostek and Trousseau reactions were found definitely positive. After the second operation the Chvostek and Trousseau reactions were still positive but the reactions were less marked and more delayed than before. In 2 other cases the reactions were mildly positive before operation and entirely negative after operation. These findings were probably due to the dietary regime described later. Among those thyroid patients who did not come to operation 2 were found to have a positive Chvostek sign. One was an extremely toxic exophthalmic goiter patient who entered the hospital moribund in coma and died within 36 hours. Autopsy was not permitted. The other occurred in a patient with non toxic goiter in which surgery was not indicated. In the first case the tetany was apparently due to injury sustained during an earlier operation in the second it may have been associated with the intense intoxication from which the patient suffered. For the 3 other cases we have no ascribable cause. Obviously the impaired nutritional state prevalent in central Europe during and immediately after the war to which Melchior (21) attributes his cases of pre operative latent tetany cannot account for our cases.

In our series the incidence of postoperative tetany varied with the extent of the opera-

tion. The size of the goiter seemed to have no bearing whatever. It appears rather that the tetany was an evidence of insufficient parathyroid function due to mechanical operative traumatism. Melchior too was forced to conclude that direct injury does play a role since the frequency of tetany after goiter operations was much higher than after operations on other structures. The mildness and transiency of the symptoms speak against gross material damage. In none of the thyroid specimens removed from the patients operated upon in the past year have we seen grossly a parathyroid gland, nor have any of our microscopic sections revealed parathyroid tissue. It is much more probable that the symptoms are due to slight injury to the glandules pressure from a haemostat or inclusion in a ligature or possibly from pressure due to hemorrhage or oedema. Interference with the vascular supply of the parathyroid bodies may explain temporary interference with their function which may be restored when the circulation is again established. Tetanic manifestations appearing late are probably due to injury of parathyroid glands from cicatricial contraction. The growing incidence of tetany is undoubtedly associated with the tendency to more and more radical excisions of thyroid tissue especially in cases of primary hyperthyroidism. Furthermore the recent increase of literature concerning the parathyroids and tetany has served to focus the attention of surgeons the world over upon this possible complication after goiter operations. We have shown by our own experience that the incidence of parathyroid insufficiency varies directly with the care in looking for it since the increase in its incidence from 1.15 to 1.4 per cent in our cases was accompanied by no corresponding change in the type of case or extent of operation.

All of our patients were operated upon after the same general plan. An attempt was made to preserve only a thin layer of thyroid tissue over the posterior capsule shaving it off under the eye as the lobe was raised toward the median line. Preliminary to this step the poles were isolated clamps grasping the vessels behind and above the upper poles.

TABLE I—ADENOMA MALIGNUM

Case	No.	G	T	D	T	Amount of Radical				Died	Age	Remarks
						Radical	Enucleation	Partial	Excision			
	3	37	m	8	Cervix	100	0	0	0	yr m	yr mo	
6	69	9			Radial	100	3				3	2
	53	0	6		Radial d by t ect my	6000					3	3
	5	6			Radial	306					5	
	7	50		4	Radial d by t ectomy	4	28				3	5
	9	54		3	Radial on	2748					3	3
	6	4	0		Radial and by t ectomy	49	6	8			4	8
	55	7			Radial d by t ectomy	69	4	8034			5	5
	4	55	0	7	Radial	3165					4	0
	5	46			Radial d by t ectomy	3	26				4	7
	7	5	3	4	Radial d by t ectomy	4660	3844				4	7
	34	55		2	Radial d by t ectomy	555					4	7
	35	6	6		Radial d by t ectomy	58	3		6 LV			
	30	54		3	Radial	4	6				3	4
	5	4		6	Radial	3	63					
	53	3	4		Radial and by t ectomy	60	4		5 LV		6	
	54	43		4	Radial	5		4	5 LV		5	
	55	5		3	Hyst t my						4	
	46	53			Radial	3890		6	5 LV			
	38	3			Radial d by t ectomy				LV		7	
	6	33		1	Radial	8	4		60 LV		8	
	67	6		3	Radial	337					8	
	68	5			Radial d by t ectomy	3	0				6	

Case in which the general structure of the glandular elements is everywhere well maintained so that a definite lumen appears surrounded by a single or a double layer of cells. The glands are increased in size and are often thrown into folds to form papillae and the stroma is decreased allowing adjacent glands to come into direct contact. The cells are enlarged irregular in size and hyperchromatic and mitoses are seen often in large numbers. But everywhere the polarity of the tissues is maintained. If at any part polarity is definitely lost as shown by the tendency of the cells to form solid masses infiltrating the stroma the case should be classified as adenocarcinoma. This should be done even though the bulk of the tumor has the structure of adenoma malignum. Capacity for infiltration

carcinoma and alveolar carcinoma. Kaufmann (6) divides the group into adenocarcinoma, papillary adenocarcinoma and adenocarcinoma solidum. The comparison of the results obtained in these subgroups showed no definite difference in their prognosis. The separation therefore presents no practical advantage at present. Future developments in treatment however may show distinct differences in their behavior and justify the classification.

Adenoma malignum (Fig. 1) includes those cases in which the general structure of the glandular elements is everywhere well maintained so that a definite lumen appears sur-

rounded by a single or a double layer of cells. The glands are increased in size and are often thrown into folds to form papillae and the stroma is decreased allowing adjacent glands to come into direct contact. The cells are enlarged irregular in size and hyperchromatic and mitoses are seen often in large numbers. But everywhere the polarity of the tissues is maintained. If at any part polarity is definitely lost as shown by the tendency of the cells to form solid masses infiltrating the stroma the case should be classified as adenocarcinoma. This should be done even though the bulk of the tumor has the structure of adenoma malignum. Capacity for infiltration

thin layer of gland tissue intact. De Quervain (3) feels that ligating the inferior thyroid arteries close to the capsule of the gland, in the region of the arterial branches to the parathyroids further jeopardizes the glandules. He recommends that the 'danger zone' including the upper pole and the posterior capsule be spared with a minimum of handling or exposure. In addition he ligates the inferior thyroid artery away from the gland close to its origin from the carotid. Syring too, considers the ligation of all four arteries a source of danger and in the presence of a predisposition to tetany releases the ligature from one of the vessels after the stump has been sutured. Eiselsberg, Grassman, Madlener (19) and others also avoid ligating all four vessels although they consider it a matter of minor importance. Maier (20), Floercken and Fritzsche (11) and others disregard the matter of ligating the vessels and ligate the four arteries without hesitancy.

Charles Mayo has suggested the 'subcapsular resection' in which the gland is lifted and the vascular branches are ligated within the capsule. W. S. Halsted (13) too advocates this 'ultra ligation' method. His method of delivering the gland controlling hemorrhage and protecting the parathyroid bodies and recurrent laryngeal nerves published nearly 20 years ago has not been improved upon.

In spite of the greatest care injury to the parathyroids may occur during operations on the thyroid gland. The location and number of parathyroid glandules is extremely variable and in the presence of goiter the displacements from the normal positions are even greater. Proper resection in toxic goiter in view of modern ideas on thyroid surgery demands radical excision of both lobes of the thyroid leaving behind only a few grams of gland tissue. In a general way we recommend that care be taken in the handling of the tissues and that particularly the posterior layer of thyroid tissue be preserved. In spite of the greatest precautions however if thyroidectomies are made sufficiently radical there will be a certain number of injuries to the parathyroid glands.

Active treatment has followed two main principles: the relief of symptoms and the replacement of lost tissues. MacCallum (18) in 1909, called attention to the specific therapeutic value of calcium in tetany, and since that time, the administration of calcium salts has constituted the most widely used and until recently the most uniformly efficacious remedy in the control of tetanic conditions. It was formerly believed that calcium has the power to alleviate the symptoms for a time only but now it has been shown (Luckhardt) that animals can be kept alive indefinitely by its use. The failures in the past in the use of calcium have undoubtedly been due to the employment of much too small doses. Luckhardt and Goldberg (17) found that in completely thyroparathyroidectomized dogs 15 grams of calcium lactate per kilo gram of body weight every 24 hours was necessary to control tetany. Clinically the lactate is most frequently used, and it is administered orally but in severe threatening cases it may be given intravenously, with almost immediate relief from convulsive symptoms. All symptomatic treatment strives to tide the patient over the acute stage of parathyroid insufficiency until the apparatus has recovered or regenerated or until the body has adapted itself to the loss. In experimental animals 4 to 6 weeks usually suffices for the organism to recover from the tetany following complete extirpation of the parathyroids. After this time, they are able to get along on stock diets under ordinary conditions without symptoms. During estrus pregnancy or lactation, however, they may again present evidences of tetany.

Replacement therapy has been attempted experimentally and clinically, since the rôle of the parathyroids in tetany was shown. Fresh and desiccated glands, extracts and even thyroid substance have been administered both by mouth and hypodermically. Most observers have found the oral administration of parathyroid substance of no avail. Lool (26) and Eiselsberg independently and within a few weeks of each other transplanted parathyroids in the treatment of postoperative tetany. Since that time conflicting reports as to the effectiveness of this

TABLE II—ADENOCARCINOMA

Case	Date	Age	Sex	Site of tumor	Treatment	Amount of Radiation				Dose	Time	Remarks
						Initial	Final	Interval	Rate			
1	45		F	Hysterectomy		1000	1000			3000	30 mo	
2	60		F	Hysterectomy						—		
3	40	6	F	Radiation		500	800					1 per h
4	40	0	F	Radiation		600	1200			300		Recurred after 1 yr
5	40	5	F	Radiation		4000				600		Recurred after 1 yr
6	57		F	Radiation		4						
7	55	5	F	Radiation		600	1400			300		Recurred after 1 yr
8	60		F	Radiation		300	600			300		Recurred after 1 yr
9	39	7	F	Radiation		3500	900			600		Extensive metastases
10	34	3	F	Radiation		1300				300		Extensive metastases
11	34		F	Radiation		3400		600	300			
12	40	6	F	Radiation		1700		500				1 per h
13	60		F	Radiation		600				600		Recurred after 1 yr
14	37	3	F	Radiation		3				400		Recurred after 1 yr
15	38		F	Radiation		6000		400	300	700		Recurred after 1 yr
16	57	6	F	Radiation		800	6000			300		Recurred after 1 yr
17	30		F	Radiation		500						
18	45		F	Radiation		2000				500		Recurred after 1 yr
19	50		F	Radiation		400				800		
20	61		F	Radiation		400				300		
21	57		F	Radiation		500				300		Slightly fixed to the uterine wall
22			F	Radiation		400				700		
23	40		F	Radiation		500						
24	65	6	F	Radiation		400				900		
25	60		F	Radiation		300				1000		
26	50	3	F	Radiation		600		1000				Extensive metastases
27	65	6	F	Radiation		300		1000		500		
28	65		F	Radiation		300		1000				
29	65		F	Radiation		300		1000				
30	35	0	F	Radiation		5000		1000				
31	70	3	F	Radiation		3700				900		

of the regime which was very gratifying to them

In one extremely severe case operated upon elsewhere there was both a high grade active tetany and complete bilateral recurrent laryngeal nerve paralysis, the combination resulting in asphyxia that at times ended in unconsciousness. The tetany was completely controlled by Collip's parathormone. The patient has now been under our observation 11 months has been entirely symptom free for 5 months and the regimen listed above has enabled her to dispense with the parathormone. But a return to a meat diet or other serious lapse results in the need for immediate return to the parathormone dosage. We have had no success with and have entirely discarded the administration of parathyroid preparations other than that of Collip.

SUMMARY

1 Parathyroid damage occurs much more frequently than is usually supposed after goiter operations in our series it was demonstrated in 14 per cent of the cases.

In most of these cases the tetany is purely latent and is not detected unless objective examination is made for the signs. Symptoms and signs are for the most part transitory, and probably represent mild temporary disturbances in parathyroid function.

2 Latent tetany may become manifest especially during pregnancy, menstruation, lactation or during the course of infectious diseases.

3 Latent tetany often occurs without demonstrable change in blood calcium levels and would appear to indicate that fall in blood calcium is an associated and not necessarily an early phenomena rather than a cause of tetany.

4 Tetany may be controlled by changing the intestinal flora to one of the aciduric type and by the administration of calcium by mouth. This regime which presumably prevents absorption of toxic materials liberated in the colon from proteolytic putrefaction consists of meat free diet, liquids in large quantities including at least 1 quart of milk daily and lactose 100 to 300 grams in the 24 hours.

5 We have used Collip's active principle of the parathyroid (parathormone Lilly) with very gratifying results. Its use is desirable in those cases in which clinical manifestations do not disappear within a relatively short period of time.

CASE REPORTS

CASE 1 M S a female 26 years of age was operated upon for exophthalmic goiter. The patient reacted well. Twenty four hours after operation she complained of some tingling in her left hand. 48 hours later this had extended to both hands and the face. There was some stiffness of the fingers and cheeks. Both the Chvostek and Trousseau signs were strongly positive.

The symptoms were completely controlled on a dietary and medicinal regime described later consisting mainly in a meat free diet, liquids pushed freely and including a minimum of 1 quart of milk daily from 30 to 50 grams of calcium lactate and from 100 to 250 grams of lactose daily. Both symptoms and signs reappeared from time to time, but were always easily controlled disappearing permanently on full diet after 8 months.

CASE 2 Mrs A B P age 23 with exophthalmic goiter had prompt and satisfactory recovery from a radical thyroidectomy. Twenty four hours later she was subjectively well in every way but gave a positive Chvostek and Trousseau reaction. Subjective disturbance first appeared after several days consisting of tingling in the fingers and cheeks. Later she was conscious of a stiffness in her cheeks and fingers. This proved to be the most obstinate and serious of our cases the only one in which the symptoms persisted for over a year. Marked carpal spasm was present with at times some stiffening of the leg muscles but she at no time had an actual tetanic convulsion.

The symptoms were usually well controlled by the regular regime at times with few dietary restrictions. The menstrual periods added but little to her difficulties. She successfully passed through an appendectomy for acute appendicitis. Her condition varied greatly at times her discomfort reaching a high degree. On several occasions she was given 3 to 4 quarts of water per duodenal catheter with immediate relief.

Collip's parathyroid extract (parathormone—Lilly) gave her relief within 2 hours usually 2 cubic centimeters sufficed but occasionally more was required. We have not had the experience of having complete and permanent relief from a single dose of Collip's extract in either this or other cases.

At one time the patient was entirely symptom free for 5 months then had her most marked disturbance ushered in suddenly by a severe fright—a burglary.

CASE 3 Mrs B B age 40 was operated upon for exophthalmic goiter. This patient remained symptom free and over a period of 7 weeks gave a

TABLE IV—ADENO-ACANTHOMA

C n mlt	Ag	G t s	D t a t Sympt m	T atm t	Am unt f R d t				De g	S	R m t
					T t t al	T t t	T t t	T t t			
4	53		y m	R d t a d h y t t my		M H cn 55.7	ho rs 1276		y m t	y m	Recurr
39	52			R d t		95		4 15 LV	5		
47	6	t		R d t d h yst ect my		3.8				7	

ADENOMYOCARCINOMATOSIS

0	40		0	R f t d h y t ect my		4.7	0.6		0		Lt ru b d
1	26		6	Radiat		575	5.7	0	0		Recurr d f richer ad t ion
36				Rad t		87	7		6 8 H y 5 LV	4	

EMBRYONAL CARCINOMA

49	9		4	Rad t		86		4 4 LV		0	
64	53			H y t t my					5		

th f ase m kd th p t w pe id pen l wh id l ped Sb th dt time t by fution h
f t d p umar h by ope l o

being in the decade 51 to 60. The average age was 53 years.

The comparison of the age incidence in the different groups of cases revealed nothing of importance nor had the age of the patient any appreciable effect on the mortality.

EFFECT OF GESTATION

Details were available in 56 cases. Of these 20 (36 per cent) were nulliparæ. Norris and Vogt (10) report an incidence of 26 per cent in single women. It would appear therefore that child bearing is not an etiological factor.

SYMPTOMS

Hæmorrhage was the outstanding symptom in all groups. Discharge was of second importance while pain was relatively infrequent. It would appear to be impossible therefore to determine the type of the cancer present from an analysis of the symptoms. Coming on as it does at the time of or shortly after the menopause with no other symptom than irregular hæmorrhage the onset of the disease is frequently overlooked. In cases showing hæmorrhage at this time of life cancer should always be excluded. Pain and

cachexia are late symptoms and should be anticipated by a diagnostic curettage.

The dangers of the diagnostic curettage have perhaps received too little attention. It may be taken as demonstrated that cancer cells may be set free in the blood and lymph channels and the danger of metastases increased. There appears to be no way of avoiding this, however the ultimate danger to the patient must certainly be less than will follow continued uncertainty in the diagnosis.

Consideration of the effect of the duration of symptoms previous to treatment on the mortality of the whole series gives at first sight a very peculiar result.

Group	Age pe- ct	nc f t	ympt ma set	Mortality pe- ct
1	Within 6 months			43
	6 months to 1 year			35
3	1 year to 2 years			80
4	Over 2 years			44

Group 1 shows a slightly higher mortality than that of Group 2. These paradoxical results are readily explained. The more malignant types produce symptoms quickly and these patients seek medical advice sooner. Consequently Group 1 contains an undue

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TABLE IV—ADENO-ACANTHOMA

Case number	Age	Gestation	Duration of symptoms	Treatment	Amount of Resection				Duration	Al	Remarks
					Intestine	Uterus	Endometrium	Adenoma			
4	53		5 m	Radical hysterectomy		M H 55 7	h 23 56		yr mo	yr m	Recurrent
37	57			Radical		205		4 5 LA	- 5		
47	60	t	t	Radical hysterectomy		3 82				7	

ADENOMYOCARCINOMATOSIS

0	40		0	Radical hysterectomy		4 7	0 6		0		Left uterus
3	0		0	Radical	575	5 7	00		0		Recurred. F the ad. ov.
36				Radical	87	7		6 80 H 5 LV	1 4		

EMBRYONAL CARCINOMA

49	9		4	Radical		84		4 4 LA		0	
04	35			Hysterectomy					5		

I use m k l th p t w s ope ted p l wh d d l ped e Sb th dt me tby ad tum. It u
th f use m k l th p t w s ope ted p l wh d d l ped e Sb th dt me tby ad tum. It u

being in the decade 51 to 60. The average age was 53 years.

The comparison of the age incidence in the different groups of cases revealed nothing of importance nor had the age of the patient any appreciable effect on the mortality.

EFFECT OF GESTATION

Details were available in 56 cases. Of these 20 (36 per cent) were nulliparæ. Norris and Vogt (10) report an incidence of 26 per cent in single women. It would appear therefore that child bearing is not an etiological factor.

SYMPTOMS

Hæmorrhage was the outstanding symptom in all groups. Discharge was of second importance while pain was relatively infrequent. It would appear to be impossible therefore to determine the type of the cancer present from an analysis of the symptoms. Coming on as it does at the time of or shortly after the menopause with no other symptom than irregular hæmorrhage the onset of the disease is frequently overlooked. In cases showing hæmorrhage at this time of life cancer should always be excluded. Pain and

cachexia are late symptoms and should be anticipated by a diagnostic curettage.

The dangers of the diagnostic curettage have perhaps received too little attention. It may be taken as demonstrated that cancer cells may be set free in the blood and lymph channels and the danger of metastases increased. There appears to be no way of avoiding this however the ultimate danger to the patient must certainly be less than will follow continued uncertainty in the diagnosis.

Consideration of the effect of the duration of symptoms previous to treatment on the mortality of the whole series gives at first sight a very peculiar result.

Group	Appearance of symptoms	Mortality per cent
1	Within 6 months	43
2	6 months to 1 year	35
3	1 year to 2 years	80
4	Over 2 years	44

Group 1 shows a slightly higher mortality than that of Group 2. These paradoxical results are readily explained. The more malignant types produce symptoms quickly and these patients seek medical advice sooner. Consequently Group 1 contains an undue

AN ENDOMETRIAL GROWTH IN THE RIGHT LABIUM MAJUS

WITH A DISCUSSION OF THE ORIGIN OF THIS TYPE OF TUMOR¹

BY J STEWART HENRY M D MONTREAL CANADA

ALTHOUGH the endometrium is normally restricted to the lining of the uterine cavity it has long been known that it may be found in other situations. Interest in the subject of aberrant endometrial or endometrium like tissue was in the first instance aroused by von Recklinghausen (36), who claimed for it an origin from embryonic rests derived from the wolffian body. In 1896 Cullen (5) showed that the generally recognized type of adenomyoma of the uterus is due to the invasion of the uterine wall by its mucous membrane and in his work upon the subject (6) he has conclusively demonstrated that this is the true origin of these tumors 'Adenomyomata' whose glands were of endometrial type have been reported by many writers notably Cullen (7) as occurring in the rectovaginal septum and Lockyer (19), who has collected 47 cases of such growths. Some authors have held that they arise from wolffian remains but Cullen believes that they are of muellerian origin, and arise either from the uterine mucosa or from remnants of 'Mueller's ducts' (7). Robert Meyer believes them to be of inflammatory origin and examples of heterotopy while Lockyer (19 p 370) cannot believe that the mature uterine mucosa has ever been *proved* to have provided the gland tissue in any extra uterine growth wherever situated and thinks it much more likely that the peritoneum or vagina is the source of the epithelium in the majority of cases.

Adenomyomata of the round ligament containing endometrial glands and stroma have been reported by Cullen (3), von Recklinghausen (19 p 271), F Weber (39), Pfannenstiel (23), Blumer (1), Martin (20), Semmelink and de Josselin de Jong (35) and others (19). Von Recklinghausen cited his case as a proof of the wolffian origin of extra uterine and extra tubal endometrium wherever found. Cullen on the other hand held that while the wolffian origin could scarcely be disproved

the true origin was probably from muellerian rests. Elisabeth Weishaupt (40) applied the serosal theory of Ivanoff (18) and Meyer (21) to round ligament "adenomyomata," and claimed that they arose by heterotopy and metaplasia of the peritoneum forming the processus vaginalis or canal of Nuck, while Lockyer favors 'arguments based upon developmental research' (19, p 320), in other words the wolffian theory.

Growths of a similar nature have been found in the ovarian ligament, and the same theories have been advanced to explain their origin. Charles D Green (16) in 1899 reported an adenomyoma of the umbilicus whose glandular elements were uterine in character, and Cullen (10) in 1916 collected 11 cases of this rare lesion.

In 1899 Russell (24) reported the finding of what he regarded as a rare anomaly namely the presence of endometrial tissue in an ovary, and argued that it arose from the germinal epithelium. Casler (2), Cullen (12), and Norris (22) also reported cases in which ovaries were found to contain endometrial tissue. Up to this time (1921) endometrial tissue in the ovary had been regarded as a decided rarity and was generally looked upon as arising from the germinal epithelium, or from embryonic rests of muellerian tissue within the ovary.



Fig 1 Photograph of a drawing of the nodule removed from the upper pole of the right labium majus and laid open to show its structure showing normal skin large cyst with smooth walls and viscid amber colored contents and small cysts embedded with the large one in fibrous tissue.

TABLE VI—ANALYSIS OF TREATMENT OF CASES OF ADENOMA MALIGNUM
(F d t a l e f d s n s e T M D)

Rad i ly				Hyst t my nly				R d t d Hy t e c t my				C r t i g e o n l y			
Dead		Al		De d		Al		D d		Al		De d		Al	
C e	D t	C	D t	Case	D a t n	C se	D t	C se	D t	Case	D t	C se	D t	C se	D t
56	yr m	6	yr mo 3	35	yr m		yr m 4 8		yr m		yr m 3 2		yr mo		yr mo 1
		5	5			7	4 7			17	5 5				
		9	5 2			55	2 4				5 5				
		24	4-9			65	-6			26	4 7				
		30	3 4							32	4-7				
		5								53	6				
		56	2 2							58	-7				
		61	8												
		67	8												

Cases r e k e d h o w e d v i d e o f r e c u r r e d e e d f u r t h e r d t

treated by pre operative radiation and hysterectomy no deaths occurred

In fairness to the simple hysterectomy it should be stated that the 4 patients in this group showing recurrences (Cases 27 35 and 68) were operated upon elsewhere and came to this hospital only after the recurrence had already developed. The corresponding successes of which there probably were a large number did not require further treatment and therefore did not come under observation. The large proportion of recurrences in this group is therefore obviously unfair.

That the contrast in the results obtained in cases of adenoma malignum and adenocarcinoma (as shown in Table V) is not due to differences in treatment is clearly shown by a comparison of Tables VI and VII.

	Ad Dead	Mal gn Al	Ad se Dead	ma Al e
Radiation only	1	9	17	6
Hysterectomy only	1	4	7	0
Radiation and hysterectomy	0	7	2	3

In each case the contrast remains clear.

The question then presents itself—Do these results give us any reason to believe that the less malignant condition adenoma malignum might be controlled by less radical measures than are required for adenocarcinoma? Should

this be the case it would greatly enhance the value of the differentiation. The number of cases is too small and the time over which they have been observed too short to warrant any dogmatic conclusions but it would seem as far as can be determined at present that in a case of adenoma malignum radiation followed by hysterectomy may be relied upon to eradicate the disease unless of course wide dissemination has already occurred. However, the results following radiation alone are so good and the avoidance of such a serious operation as hysterectomy so desirable that in spite of the single fatality it would seem justifiable to select radiation as the treatment of choice.

On the other hand the results in adenocarcinoma do not appear to justify the use of radium alone in operable cases. Neither radiation alone nor hysterectomy alone has given as good results as have been obtained by their combination. All cases of adenocarcinoma even those that clinically appear most favorable should be considered of extreme gravity from the outset and the most thorough and persistent treatment employed. *Suspicious cases.* The 2 deaths in this group of cases were due to diseases other than carcinoma. The absence of any cancer mortality shows that the danger is slight in this group when proper treatment is given. Such



Fig. 4 (See Fig. 2 B) A low power photomicrograph of part of field shown in Figure 2. It shows the relation of the fibrous tissue of the nodule to some of the masses of stroma. Note the high columnar epithelium at A.

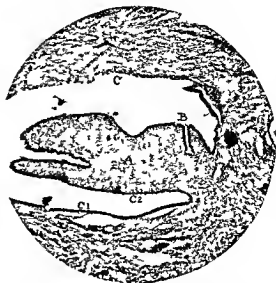


Fig. 5 A low power photomicrograph of the cyst shown at B in Figure 4. Endometrial stroma B a characteristic endometrial gland its distal extremity is slightly forked and contains free red blood cells. Br a dilated gland C very high columnar epithelium lining the cyst and here lying directly upon fibrous tissue it is slightly lower at C1 and C2.

last 10 years before operation both instrumental deliveries. Three years prior to operation she noticed a small hard nodule in the upper part of the right labium majus since when this nodule gradually increased in size and a short time previous to admission she noticed a second small nodule close to the first. The nodules were tender at all times and from the first became swollen and painful at each menstruation. Latterly the swelling and pain were felt 1 or 2 days before each period and reached a maximum on the third or fourth day then faded away and reached the premenstrual size and condition after about 9 or 10 days. She had noticed that when the nodules were swollen and painful coughing or sneezing caused an increase in the pain and her clothing irritated them. Examination showed a nodular swelling about the size of a walnut situated in the substance of the upper extremity of the right labium majus. It was fairly firm and movable in and over the surrounding tissues. There were no signs of inflammation about it. Examination of the pelvis was negative. The patient was operated upon 2 days before she expected to menstruate. The mass was removed without difficulty. It did not appear to infiltrate the surrounding tissues and the round ligament was not encountered.

Pathological report (S-24-1068) The specimen consists of a piece of tissue measuring 5.2 by 3.1 by 1.6 centimeters. It is roughly triangular in cross section and is covered upon one surface by normal skin. The cut surface exposed by dividing the specimen longitudinally shows one large cyst 1.7 by 1.3 by 1.3 centimeters lying near one pole and filled with a clear amber colored viscous fluid. Its walls are

smooth and white except for a few areas which are of a rather deep orange color. Near this cyst are several smaller cysts separated by thick white bands and containing a fluid similar to that in the larger one.

The following description is based on the study of many sections made from various parts of the specimen and stained with differential stains.

Sections taken through the margin of the specimen so as not to include the large cyst show that it consists of a nodule of fibrous tissue lying directly under the intact skin and surrounded by subcutaneous fat and connective tissue (Fig. 1). The fibrous tissue is arranged in an irregular manner and there is no smooth muscle in the nodule except that of the walls of its numerous blood vessels. In the central and deeper portions a number of cystic spaces of irregular shape are seen the greater number of which contain projecting masses of a tissue which stains deeply with hematoxylin (Fig. 2).

The cysts are lined by a single layer of epithelial cells which in part lie directly upon the fibrous tissue and in part upon projecting masses of a very cellular and deeply staining tissue. Where the epithelium is in contact with the fibrous tissue it is flat but where it lies upon the cellular tissue it varies from cuboidal to high columnar. The projecting masses of cellular tissue lie upon the surrounding fibrous tissue which

both from the age of the patient and from the duration of the symptoms would be that the young woman offered the worse prognosis. She was treated by radiation alone and after 2 years 9 months was reported to be alive and apparently well. The other patient was treated by hysterectomy and died 1 year 5 months after operation. Again the facts are too few to warrant any conclusion but in view of the well recognized susceptibility of embryonal carcinoma to radiation and the bad results following operation the outcome is at least suggestive.

Putting aside then the rarer tumors of definitely distinct structure the facts brought out in this study would seem to justify the separation of the main mass of cancers of the body of the uterus into two groups which are fairly distinct and have a very different prognosis and which may also demand a different method of treatment. The use of the term adenoma malignum for the less malignant of these groups appears to be justified by its persistence in the literature and in ordinary use over a long period in spite of much adverse criticism and by the fact that it adequately describes the histological picture. That adenoma malignum is essentially a different disease from adenocarcinoma is not evident. The frequent association in the same preparation of areas typical of both would seem to indicate that they are different phases of the same condition. But the essential point to the surgeon and to the patient is that they behave differently and this difference can best be emphasized by the use of distinct terms.

CONCLUSIONS

Cancer of the body of the uterus is a disease of late middle life the incidence being in the sixth decade (51 to 60 years) following the menopause. Child bearing is not an etiological factor.

After the separation of the distinct types adeno-acanthoma, adenomyocarcinomatosis and embryonal carcinoma which are relatively infrequent the main mass of cases can be divided into two groups the basis of the division being loss of polarity and the infiltration of the stroma by solid cords or masses of cells. Cases characterized by normal polarity

and showing no infiltration are classed as adenoma malignum. Where polarity is lost and there is a definite tendency to infiltration the case is classified as adenocarcinoma.

In all, 70 cases of fundus carcinoma were studied.

Adenoma malignum (23 cases with 2 deaths) is of relatively low grade malignancy and responds well to treatment. Pre-operative radiation and hysterectomy gave the best results (7 cases no death) but the almost equally good results of radiation alone (10 cases, 1 death) would seem to warrant its selection as the treatment of choice.

Adenocarcinoma (30 cases with 21 deaths) offers a very bad prognosis and demands rigorous treatment from the outset. The best results were obtained by pre-operative radiation and hysterectomy, each of which alone was unsatisfactory.

Suspicious cases of fundus carcinoma showed no mortality due to cancer and appeared to be effectively controlled by radiation alone.

Adeno-acanthoma and adenomyocarcinomatosis have a high mortality and require the same treatment as adenocarcinoma.

Embryonal carcinoma was present in 2 cases only and the results are in conformity with the belief that better results are obtained in this class of case by radiation alone than by operation.

The difference in the behavior of the two main groups, adenoma malignum and adenocarcinoma justifies their separation. The present tendency to consider as a uniform disease all cases of carcinoma of the fundus uteri is not based on fact and must undoubtedly lead to a uniform misconception of the prognosis and treatment. The adoption or rather the retention of the two groups, adenoma malignum and adenocarcinoma, emphasizes the distinction and tends to secure for each group its requisite attention and treatment.

I wish to express my thanks to Dr. Healy, Dr. Ewing and Dr. Flier for their kindness in placing their pathological material and clinical records at my disposal.

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pigment derived from old hemorrhages. There are also here and there collections of fresh red blood cells. At one end of the cyst there is an incomplete epithelial lining which is flattened where it lies upon fibrous tissue and high columnar where it rests upon a layer of stroma. The stroma here, as elsewhere, contains evidence of recent hemorrhage and is of uterine type (Figs 6 and 7). Several small cysts lie close to the end of the large one and in general structure present the same appearance as those already described. In one of them cilia can be plainly seen (Fig 8).

Further sections taken from different parts of the nodule present appearances similar to those described viz cystic spaces of varying size lined wholly or in part by an epithelium which lies partly in contact with the fibrous tissue where it is generally flattened and partly upon projecting masses of stroma where it is high columnar in type, and in places ciliated. Uterine glands both normal in contour and dilated are scattered throughout the fibrous tissue and occasionally rest directly upon it but by far the greater number have a mantle of uterine stroma about them. The masses of stroma which project into the cysts contain typical uterine glands and fresh hemorrhages are seen between the stroma cells and within some of the glands. The nodule is therefore an adenofibroma containing uterine glands and stroma and in all essentials corresponds to the intrapelvic ectopic endometrial growths. Its endometrial character and origin are further evidenced by the finding of recent hemorrhages and signs of old ones scattered throughout the glandular and stromal elements.

The smaller cysts with their projecting masses of stroma and epithelial lining correspond to the pseudoglomeruli of von Recklinghausen (36 37 38), which he considered to be evidence of their origin from the wolffian body. They are also identical with the 'miniature uterine cavities' which Cullen (7 8 and 9) describes (Figs 2 and 6).

A comparatively small number of cases similar to the foregoing have been reported and all have been grouped together as adenomyomata of the round ligament. Such adenomyomata have been reported as occurring in three sites namely (1) intra-peritoneal (2) within the inguinal canal and (3) outside the external abdominal ring in the upper pole of the labium majus. No attempt has been made to collect all the reported cases but the following will serve to illustrate adenomyomata more or less intimately associated with the round ligament in each of the three possible locations.

The first case to receive critical study was that reported by Cullen in 1896 (3). The patient was 37 years old and had been married 13 years. For about 8 years before coming under observation she had been aware of a small nodule in the right inguinal region. Seven years before she had had an instrumental delivery. The nodule was painful and increased in size and became more painful during menstruation. It had grown slowly especially during the last 2 years. It was situated in the upper part of the right labium majus and was firmly fixed to the deeper tissues. At operation the nodule was found to be firmly attached to the right round ligament which contained a second smaller nodule within the inguinal canal. Of these only the first was examined microscopically. It measured 3.5 by 3 by 2 centimeters and was made up of a dense network of interlacing bundles of smooth muscle fibers and contained many glands lined by a columnar epithelium and for the most part surrounded by a cellular stroma though in a small number the epithelium lay directly upon the smooth muscle. Both glands and stroma were of the uterine type. There were also several "miniature uterine cavities" corresponding to the "pseudoglomeruli" of von Recklinghausen. The lining epithelium of these cavities was low cuboidal where it lay directly upon the smooth muscle and high columnar where it lay upon the projecting masses of stroma. The patient had just passed her last menstrual period by 3 days when she was operated upon and recent extravasations of blood were found in the stroma of the glands and of the 'miniature uterine cavities'.

From the history of increase in pain and in the size of the nodule at the menses the similarity in structure and function between its glands and those of the endometrium and especially the similarity of glands and stroma to those found in diffuse uterine adenomyomata Cullen concludes that the endometrial elements of his case are of embryonic müllerian origin although he admits the possibility that they might arise from wolffian remains in the round ligament.

Seven months after the first operation Cullen (4) removed a second nodule from the

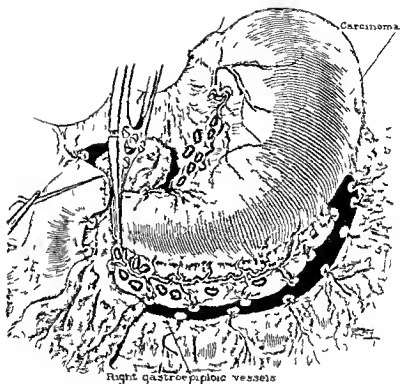


Fig. 6 Mobilization of the stomach. The gastrocolic omentum has been divided and ligated to a sufficiently high point on the greater curvature.

great divergence of opinion as to their origin and the question cannot yet be looked upon as being entirely settled. It is reasonable to assume that, since in structure and function all ectopic endometrial growths show a striking identity, they probably have a common origin. Sampson's writings on intraperitoneal ectopic endometrial growths have practically settled the question of the origin of that group. They arise, almost certainly, by implantation of adult endometrial cells carried into the pelvic cavity along with menstrual blood. It is quite in keeping that all other ectopic endometrial growths should also arise from adult endometrial cells. Sampson has found that the intrapelvic growths occur in the vast majority of cases between the age of 30 and the menopause. The case here reported and those quoted all fall between these ages except in the case of Martin's patient who was 71 and Weber's, whose age is not ascertainable. Other cases have been reported as occurring before the age of 30 and after the menopause as was found by Sampson in his series of intrapelvic cases but the majority have this feature also in common with nearly all of the intrapelvic cases and this too seems to point toward a common origin. It is quite possible that those which occur upon the intrapelvic portion of the round ligament arise by implantation. The intra-anal cases may also arise in the same way if the processus vaginalis be patent and have a free opening into the peritoneal cavity menstrual blood with endometrial cells might conceivably be swept into its opening by intestinal peristalsis.

Implantation does not appear to be as probable an explanation of those cases which occur in the labium majus. Yet it is conceivable that if the skin of the labium were excoriated during menstruation some cells might lodge in a fissure and grow there infiltrating the tissues and producing a nodule of fibrous tissue containing glands. If uterine epithelium were to invade the subcutaneous tissues the natural reaction on the part of the invaded tissues would be the production of a mass of fibrous tissue about the growing glandular elements. It is also conceivable that during instrumental delivery the skin of

the labia majora might be traumatized and decidual cells implanted in the traumatized areas. We know that human decidua can be transplanted in abdominal wounds during caesarean section (34).

There are however two other means by which cells from the adult uterine mucous membrane may be carried beyond the limits of the pelvic cavity and give rise to endometrial growths. They may be disseminated through either the veins or the lymphatics of the uterus and their pelvic connections, as Sampson (32, 33) has explained.

In a paper published in 1918 Sampson (31) demonstrated that if uteri were injected with a suspension of biemuth or bismuth and then removed the injection mass was retained in the uterine cavity and the tubes if the uterine mucosa were intact but if it were damaged as it is after menstruation, parturition or curettage the mass passed into the receiving venous sinuses which lie close to the uterine cavity and thence to the uterine veins. With this in mind it is easy to see that during menstruation portions of epithelium or stroma may enter these veins and be carried by them to any part of the body and the same may happen following curettage or parturition. The flow of venous blood is in a direction away from the endometrium and this would tend to draw particles of endometrial tissue into the venous sinuses. The uterine veins are devoid of valves and communicate with the vaginal plexus and middle and inferior hæmorrhoidal plexuses and the latter communicate with branches of the internal pudendal vein which drains the labium majus. Since the pressure in the uterine and other pelvic veins varies considerably and may at one time be negative and at another positive, particles of endometrial tissue could quite conceivably be carried by a retrograde venous flow into the rectovaginal septum, the labium majus or the round ligament. At all events we know that placental cells are carried in the venous circulation to lungs, liver and other organs and that the cells of chorioepitheliomata are carried in a similar manner and that metastases of chorioepitheliomata in the vagina and parametrium are very common.

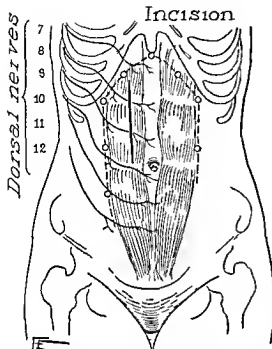


Fig. 1 The broken line extending from the xiphoid to the borders of the recti muscles and following down their margins is the line of infiltration from the skin to the deep fascia and blocks the intercostal nerves as they terminate in the structure of the abdominal wall

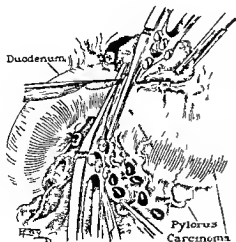


Fig. 4 Division of duodenum

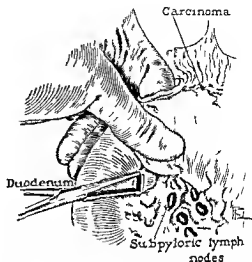


Fig. 5 Mobilization of the pylorus stomach and duodenum selection of a bloodless area on the inferior border of the duodenum to begin the dissection and ligation of the gastroduodenal artery

The abdominal wall block is induced over a certain area as shown in Figure 1. Exploration can then be satisfactorily carried out and should resection be found possible an ethylene-oxygen ether combination may be administered. In some respects this is the safest anesthetic I know of for such cases.

INDICATIONS FOR OPERATION

Exploration should be thorough particularly of the pelvic peritoneum and liver. Usually examination of the stomach and the adjacent lymph nodes promptly reveals whether resection is advisable. It cannot be too frequently emphasized that fixation of the tumor and extensive enlargement of the lymph nodes do not necessarily mean that the disease is inoperable or incurable since such conditions may be due to inflammatory processes. In fact some of the most striking cures have been accomplished in this type of case. Although operations for extensive and incurable cancer are to be decried it is probable that until better methods of surgery are devised for the cure of cancer on reasonable attempts to remove the growth will be made in advanced cases simply because removal offers the only possible chance of cure. Resection of the growth is occasionally permissible for palliation only that is when it is known that metastasis exists. Sometimes extremely large tumors which from every point of

in the round ligament (2) metaplasia and heterotopy of the peritoneal endothelium of the processus vaginalis peritonei or canal of Nuck or (3) metaplasia of the endothelium of dilated blood or lymph vessels. Sampson, comparing the distribution of ectopic endometrial growths in general with that of the metastases of uterine and ovarian carcinoma and recognizing their striking similarity, has concluded that the former may and probably do originate in the same way as the latter namely (1) by vascular (venous or lymphatic) dissemination of adult endometrial cells through the uterine veins or lymphatics or both and (2) by direct implantation of the same within the pelvis. Vascular dissemination probably accounts for the majority of endometrial growths of the round ligament including its attachment in the labium majus the lymphatic channel is a more direct one than the venous. It is quite possible that endometrial cells may be implanted in fibrial excoriations during menstruation or decidual cells may be implanted if the labia are traumatized during delivery. It is known that both normal human endometrium and decidua can be implanted and will grow in abdominal scars.

The thanks of the writer are due to Dr. David Patu L. for permission to report this case to Dr. L. J. Rhea, director of the Pathological Laboratory of the Montreal General Hospital for his encouragement and valuable criticisms and to Dr. J. A. Sampson who examined sections from the case under discussion and offered valuable suggestions.

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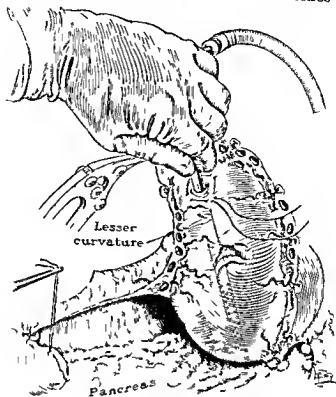


Fig. 7 Stomach being emptied by suction pump

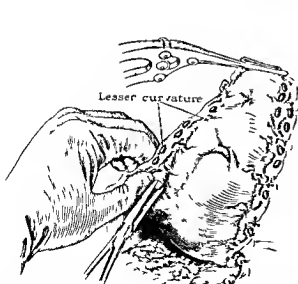


Fig. 8 Making opening in gastrohepatic omentum preparatory to its clamping and division

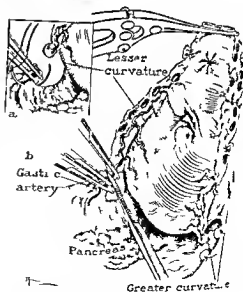


Fig. 9 Division and ligation of gastrohepatic omentum at site of gastric artery

maintained that in general, histology does not give a guide to the degree of malignancy. Von Hansemann's ideas seem to have received wide acceptance and 14 years later Frankl's (2) discussion of adenoma malignum agrees in all essentials with von Hansemann's views.

Recently, however, a new interest has been taken in the correlation of the histological findings and the clinical results of many types of cancer and some success has been attained. Mahle (8) in a very careful and thorough review of 186 cases of fundus carcinoma treated at the Mayo clinic, by estimating the amount of tissue differentiation observed divided his cases into 4 grades. In Grade 1 which showed the least departure from the normal no deaths occurred. In Grade 4 showing extreme departure every patient died. A relation between histological structure and the clinical progress of the case therefore existed. This was essentially a quantitative estimation of the degree of malignancy.

In the present study the attempt has been made to find some qualitative point of differentiation. For this purpose an examination was made of all cases of fundus carcinoma treated in the Memorial and New York Hospitals since 1917. Only those cases have been omitted in which histological material was not available or in which owing to the disappearance of the patient after treatment or for other reasons a record of the progress of the case could not be obtained.

At the Memorial Hospital radium and roentgen ray therapy has to a certain extent replaced radical operation and as a consequence in the majority of cases histological material only has been available. In some respects this has hindered the study and rendered it incomplete. It has however this advantage that the material corresponds exactly to that available to the pathologist at the time that he is called upon to make his critical diagnosis.

Histological examination of sections of fundus carcinoma shows a wide variation in structure and makes it possible to separate from the main mass of cases three definite groups which though not very large can be considered distinct diseases. These are adenocarcinoma, adenomyocarcinomatosis and embryonal carcinoma.

Adeno acanthoma (Fig 3) shows a combination of glandular and epidermoid epithelium the latter believed to be derived by metaplasia from the superficial epithelium lining the body cavity. Cell nests are not uncommon and produce a very characteristic picture and rarely the differentiation may be so complete that prickly cells are found.

Adenomyocarcinomatosis covers a distinct group of cases in which the malignant process arises in a previously existing adenomyomatosis. The histological diagnosis of this disease from curettings is difficult, often impossible and in such circumstances a diagnosis of adenocarcinoma will probably be made. Usually recognition of a case of adenomyocarcinomatosis is made only after the removal of the uterus. The organ is large and on naked eye examination may show no evidence of the disease beyond a slight roughening of the endometrium. But on microscopical examination carcinomatous foci are seen extending between the very cellular muscle fibers throughout the whole uterine wall. The disease probably arises from a focus or foci of adenomyoma deep in the muscle wall therefore by the time it reaches the endometrium and gives rise to symptoms the whole wall is permeated often to the peritoneal coat.

Embryonal carcinoma (Fig 4) also forms a small but definite group. It is composed of sheets of closely packed round and polyhedral cells which are small and contain large darkly staining nuclei and little cytoplasm.

These three groups include only a few of the cases the majority consisting of tumors of definitely glandular structure. At one extreme are the almost completely differentiated types in which the carcinomatous nature is indicated by the increase of glandular tissue with diminution of the stroma, the increased and irregular size of the cells, and the hyperchromatic nuclei. At the other extreme differentiation is slight and the tumor is composed of solid masses of highly atypical cells deeply infiltrating the supporting structures. Between these two extremes extends an unbroken series of intermediate cases. They may be divided into two groups adenoma malignum and adenocarcinoma. Ewing (1) further subdivides adenocarcinoma into papillary adeno-

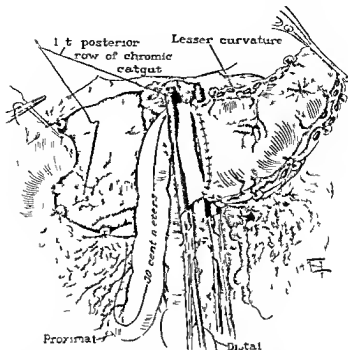


Fig 11 The relation of jejunum to stomach at the beginning of an antecolic end-to-side anastomosis

placing it on tension, an area on the lesser curvature free from vessels can be selected at a suitably high point and by blunt dissection with forceps the tip of finger can be carried from the anterior side through this opening and the forceps introduced into it (Fig 9). Then the forceps are carried through and the entire omental attachment clamped. Two other pairs of forceps are placed above this and the omentum divided above the lower two forceps. This gives a most precise and safe control of the entire gastro-hepatic omentum and the stump can be transfixed with a double chromic catgut suture beneath the two pairs of forceps (Fig 9 a). After all the omental tags are divided and ligated the stomach is again carefully inspected to determine the limits of the tumor and a rubber covered clamp placed across the stomach far enough from the limits of the growth to make certain that it will not be encroached on when the stomach is divided.

The re-establishment of gastro intestinal continuity is the next question to be considered. This is governed largely by the extent of the operation. In resections of moderate extent the posterior transmesocolic end-to-side anastomosis

the method ascribed to Polya can be satisfactorily performed with the proximal jejunum applied to the lesser curvature of the stomach and the distal to the greater the proximal loop being about 12 centimeters long (Fig 10). If however as is more often the case the resection is more extensive a method which I described in 1917 that is end-to-side anastomosis in front of the colon has distinct advantages. The first loop of the jejunum about 30 centimeters long is brought up in front of the colon. A section of jejunum corresponding to the size of the opening in the stomach is caught lightly in a rubber covered clamp (Fig 11). It is seldom that this section of jejunum is larger than the usual gastro enterostomy opening. The emptying of the stomach as previously described will permit the stomach to contract to a reasonable size and it is only rarely that one must partially close the end of the stomach before uniting the stomach and jejunum. As a matter of fact I believe that it is safer to employ the entire end of the stomach in the anastomosis. The first line of chromic catgut sutures unite the jejunum to the stomach and particular care should be taken to place two or three closely



Fig 1 Adenorrhoma tumour



Fig Adenocarcinoma

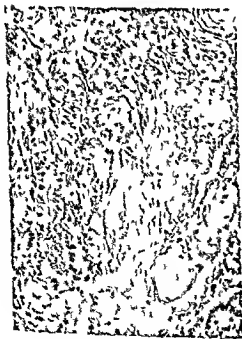


Fig 3 Adeno-acanthoma



Fig 4 Embryonal carcinoma

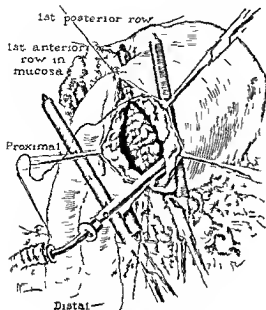


Fig. 13 Loosening clamps after posterior rows have been completed to empty stomach and inspect posterior suture line

in the position which they will occupy that is to the left of the median line and if possible the left portion of the omentum may be arranged over the site of the anastomosis

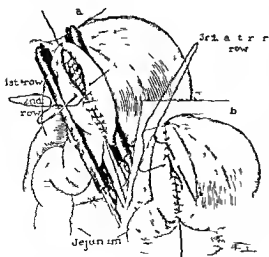


Fig. 14 a Second anterior row (seromuscular) suture b anterior row (serous suture) continuation of first posterior row

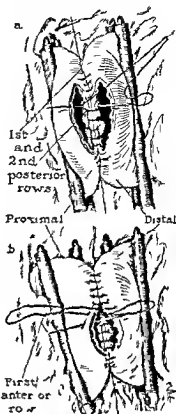


Fig. 15 Entero-anastomosis a Second posterior suture through all coats b Anterior suture line

The operation is completed by re-enforcing the duodenal stump with another pursestring suture of chromic catgut when necessary or if the stump has been easily closed by simply drawing the tags of the gastroduodenal and the gastrophrenic omentum over the suture line with the suture placed on the outer wall of the duodenum so that as the suture is tied the duodenal stump is carried backward into the pocket between the head of the pancreas and the inner wall of the duodenum (Fig. 16). Finally after the entire field is inspected for air, bleeding points in omental tissues and the upper abdomen is washed out with warm sodium chloride solution the abdomen is closed (Fig. 17).

POSTOPERATIVE CARE

In the postoperative care of patients who have undergone partial gastrectomy, it is most important that the stomach be kept clean and that

TABLE III—SUSPICIOUS CASES

C	mbe	A	t	t	t	T	Am t f Rad also				D	U	R
							1	1	1	1			
5	35	3	y	m	Rad t		M	c	h	960	0047		
8	49		3		Hy t t my								I t t l l b t t
9	5				R d t		950	3	48	680		3	4
4	4	t	7		R l t				344				
6	75	7			R d t				406			4	7
45	5				Hy t t my							5	
60	33		6		Rad t				706			7	
6	45	4			Rad t				3	35		9	
69	64	3	-		R d t				57			4	D betes

and the loss of polarity are definite evidence of a higher degree of malignancy and the most malignant portion of a tumor should be selected in determining the degree of its malignancy.

Adenocarcinoma (Fig 2) therefore includes all cases in which there is a definite loss of polarity and infiltration of the stroma by solid cords or masses of cells. It will of course often show other indications of increased malignancy, the cells showing a greater departure from the normal as indicated by greater variations in size and staining, irregular hyperchromatic nuclei and other evidences of anaplasia. To make a definite line of separation it is necessary to select one characteristic as a criterion and the justification for the somewhat arbitrary selection of loss of polarity and infiltration would appear to be justified by the contrast in the results obtained in the two groups thus separated.

Cases were considered separately when any doubt, however slight, existed as to the malignant character of the process. This was relatively infrequent. As a rule the distinction between carcinoma and the various benign processes was sharp and distinct but occasionally it was thought advisable to qualify the diagnosis by such terms as "suspicious" or "beginning" or to use such a phrase as "atypical adenomatoid endometritis suggestive of carcinoma." All such cases have been

considered separately under the heading "suspicious."

For this study, after the elimination of those cases in which histological material or adequate records were unavailable, there remained 70 cases which were classified as in Tables I to IV.

GENERAL MORTALITY

Of the 70 patients observed, 31 (44 per cent) have already died. Taking into account the short period which has elapsed since treatment in many of the cases, this represents a high mortality, which is contrary to a commonly accepted belief that carcinoma of the fundus is relatively of low malignancy.

EFFECT OF AGE

Details were available in 67 cases. Arranged in 10-year groups the following distribution was obtained:

Age	Cases
20 and under	1
21 to 30	1
31 to 40	5
41 to 50	16
51 to 60	30
61 to 70	11
71 and over	3

Eighty-five per cent of all cases occurred between the ages of 41 and 70 years, 45 per cent

FROM THE ROYAL BAVARIAN ORTHOPEDIC CLINIC OF MUNICH

THE OPERATIVE SPLINTING OF THE VERTEBRAL COLUMN IN
POTT'S DISEASE

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Professor Orthopedics, Orthopedic Clinic of the Royal Bavarian Orthopedic Clinic of Munich

BEFORE 1902 I made repeated attempts to design a type of corset that would arrest the very rapid development of the deformity in Pott's disease. After a number of years of experimentation I came to the conclusion that the corset alone would not solve the problem.

The readiness with which surgically implanted foreign bodies become healed suggested to me the feasibility of an operative splinting of the vertebral column.

The first operation of this kind I performed in the year 1902 and reported personally about it at the surgical congress in Washington in the year 1910. For this operation common steel splints were used.

Since that time several surgeons have followed my example or have modified my operation (Albee, Henle, and others). During the period of 1920 to 1924 I have operated on 52 cases and have used exclusively cylindrical splints made of celluloid from 5 to 10 millimeters in diameter and from 10 to 30 centimeters in length.

PREPARATION OF THE PATIENT

For several days before the operation the patient receives daily baths and any impurities of the skin are attended to. On the night before the operation the bowels are evacuated. The patient is shaved just before he receives the anæsthetic. The latter is administered by commencing with ethyl chloride, a little eau de Cologne being added. We then follow this with the usual anæsthesia by the open method. The skin is cleansed with alcohol and painted with tincture of iodine.

TECHNIQUE OF THE OPERATION

I make the skin incision close to and parallel with the line of the spinous processes. The length varies from 10 to 30 centimeters according to the length of the area to be splinted. Fascia and muscles are then divided the full length of the incision and as close as possible on both sides of the spinous processes. With a 2 centimeter bladed sharp raspator the muscles are detached to the depth of the vertebral arches.

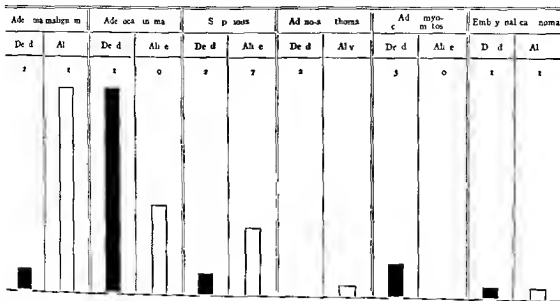
The most important part of the above procedure is to exercise an even and firm pressure and to cover with compresses and other dressings all cut parts for the purpose of arresting hæmorrhage. If this is done properly by the assistants the loss of blood is quite minimal and the tendency to hæmorrhage should cease within 5 minutes.

Ligatures are seldom required. Each of the now exposed spinous processes are perforated at the upper half and a loop of silk thread (No. 12) is carried through the hole. For this purpose I generally use the Reverdin needle. Through a second hole drilled a little below or through the interspinous ligaments the same loop of thread is returned to the other side leaving thus a U shape of double thread on the one side and the four open ends on the other. Celluloid splint which has been fitted exactly to the curve of the gibbus is inserted into the U shaped loop and another similar splint is placed on the other side of the spinous processes. The latter splint being now grasped between the free ends of the thread with a firm tension is securely tied to the spinous processes with a knot. The splints must be so tightly secured that any movements would appear impossible. They are then carefully covered up with muscles and fascia and sutured in the ordinary way with silk No. 6. Upon this is to follow a deep and superficial suturing of the subcutaneous tissue with silk No. 6 and No. 3 respectively.

The dressing. The patient is placed in the abdominal position, a moderate lordosis being allowed. After the whole back has been padded with cellulose wadding we place over the splinted region two thick cushions 5 centimeters thick. The cushions are to take the weight of the plaster of Paris dressing and to relieve the field of operation from undue pressure. After the padding has been covered with a plaster-of-Paris dressing extending over a part of the head in cases of dorsocervical gibbosities a large window is finally cut into the plaster over the operative area.

The dangers of the operation. Apart from controlling during the operation the possible hæmorrhage

TABLE V —MORTALITY IN ALL GROUPS



proportion of the more malignant cases and has a higher mortality. When the cases are considered in groups it is found as would be expected that the sooner the patient receives treatment the better the results.

RESULTS OF TREATMENT

Before an analysis of results with different forms of treatment is discussed a comparison may be made of the results in the different groups. In the three small groups adenocarcinoma, adenomyocarcinoma, and embryonal carcinoma the cases are so few that little can be learned beyond the fact that the mortality is high. In the others however the results are highly significant. Only a few cases have been observed and some for so short a time that the results cannot be accepted as final. However the results are taken from cases observed over the same period of years and in the main the treatment in the various groups has been similar so that while the figures cannot be accepted as having an absolute value they are at least comparable.

Table V shows a striking difference in the mortality of adenoma malignum and adenocarcinoma. Adenoma malignum is shown to be a disease of low mortality. This becomes even more marked when it is noted that this

group includes 4 patients who first came to this hospital on account of recurrences following hysterectomy. One of these cases accounts for 1 of the deaths, the 3 other patients are still alive. The respective periods since the recurrence being 4 years 8 months, 4 years 7 months and 6 months. To compare these groups fairly, allowance must be made for the short period that has elapsed since treatment in many cases. Of the 23 cases of adenoma malignum there are 12 three year cures and 4 patients are dead. Of the 30 cases of adenocarcinoma there are 4 three year cures and 21 patients are dead.

There would appear therefore to be sufficient evidence to show that adenoma malignum is a much less fatal disease than adenocarcinoma and to suggest that the methods employed have been effective in the treatment of adenoma malignum so far as this can be determined at the present time. In contrast to this the results in adenocarcinoma have been far from satisfactory.

Table VI shows that out of 10 cases treated by radiation only, 1 death occurred, and in 1 instance a recurrence developed necessitating further radiation. Of the 5 cases treated by hysterectomy only 4 developed recurrences and 1 of these died. Among the 7 cases

answer can in my opinion not be given for at least 15 to 20 years after the operation. At present I can judge only the immediate results. I am glad to say that I have experienced only one disappointment with a patient who was suffering from a lumbar gibbosity of Pott's disease. Contrary to instructions the patient had left off his corset 6 months after the operation. That his hump got worse was only to be expected as splints and silk fixtures could certainly not have acquired in that short time tissue of sufficient resistance.

MODIFICATIONS

As to Albee's and Henle's modifications in which the vertebral column is splinted with chips taken from the tibia of the patient I would like to give my reasons here for preferring my method. It will be readily understood how frail a freshly derived bone chip must be for splinting purposes. A continuous risk during convalescence is fracture of the bone splint due to some brisk movement of the patient. This risk demands a very careful and prolonged plaster of Paris dressing and a stay in bed of 6 months or longer. On the other hand splinting with celluloid or steel gives considerable stability of the vertebral column

almost at once. Proofs of this are the disappearance of pain immediately after the operation and a general improvement in health. The fact that my patients are allowed to get up after 6 or 8 weeks I consider another great advantage over Albee's modifications; the patient is able to be outside in the fresh air, a very important factor in the treatment of any tuberculous disease.

CONCLUSION

Since 1904 I have altered my technique by using one splint made of rust proof steel placed on the one side with a celluloid splint on the other.

I started the use of this modification after experiments on animals had proved that the healing in process of steel was quite as satisfactory as that of celluloid. For fixing the splints to the spinous processes I now use thin steel wire of the rust proof variety instead of silk. The advantage of steel which naturally has greater stability than celluloid is evident. I dare say a 3 to 4 millimeter steel splint would quite favorably compare in stability with a 10 millimeter celluloid splint. Consequently I expect I shall soon abandon the celluloid splints altogether and employ steel ones only.

TABLE VII—ANALYSIS OF TREATMENT OF CASES OF ADENOCARCINOMA
(For details see text and Table II)

Rad 1				Hyst 1 only 1y				Rad 2 and Hyst 2 only			
Dead		Alive		Dead		Alive		Dead		Alive	
C	Disto	Ca	Disto	Ca	Disto	C	Disto	C	Disto	C	Disto
r	y m		y m		y m		y m		y m		y m
1	3 7	1	5	3	5				4	45	3
3		4	7 5							46	- 7
5	5	17									
	3	65									
75	1 8		- 9								
1	3 6										
3	5										
	0										
33	1										
38	1- 7										
43	5										
44	3										
51	9										
59	6										
67	4										
68											

Case made known to the doctor in the last 10 months
Case made known to the doctor in the last 10 months

cases perhaps should be considered as potential rather than actual cancer the evidence in each case being insufficient to justify an absolute diagnosis. Histological examination shows them to be on the borderline of adenoma malignum and if similarly treated there is little danger to life. Radiation therefore would seem to be the procedure of choice.

Adeno-acanthoma In this and in the remaining groups the numbers of cases observed are very small but they indicate the gravity of these conditions. In the adeno-acanthoma group are 2 cases. Two patients are already dead. One of these was treated by radiation only the other by hysterectomy with radiation of a subsequent recurrence. The third treated by pre-operative radiation and hysterectomy is alive 2 years 7 months after treatment. The structure of the tumor shows its relationship to adenocarcinoma and the results of these few cases suggest that a similar rigorous treatment should be adopted.

Adenomyocarcinomatosis Of the 3 cases in this group all are dead. Two treated by radiation alone died after 2 years 9 months and 1 year 4 months. The third, treated by pre-operative radiation and hysterectomy died in 2 years 9 months. As already indicated this disease arises deep in the uterine muscle during the course of a previously existing adenomyomatosis. Before any symptoms appear and therefore long before any treatment can be begun opportunity has been given for a widespread dissemination. It therefore offers a very grave prognosis and demands radical treatment.

Embryonal carcinoma is an extremely malignant type but like any embryonal tumor it appears to be sensitive to radiation. Of the 2 cases in this group 1 (Case 49) occurred in a young woman of 19 years who gave a history of symptoms for 4 months. The other patient (Case 64) was 55 years of age and had had symptoms for 2 months. The expectation

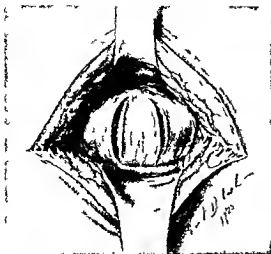


Fig 2 Exposure of prostate with elliptical incisions into the capsule and substance of the adenoma. These incisions are carried well to the outer sides of the urethra.

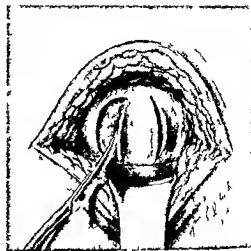


Fig 3 Beginning dissection of the adenoma external to the urethra from which it is lifted by means of an elevator.

tion of the muscle. In the region of the triangular ligament the muscle is reinforced by stout annular bundles of fibres from the compressor urethrae muscle. When this is stimulated to contract either by voluntary or actual involuntary reflex stimulation it contracts around the canal and furthers sphincteric control. It is this contraction at the point where the urethra passes between the

two layers of the triangular ligament that impedes the entrance of a sound or instrument into the bladder. At the point at which the prostatic urethra enters the bladder it is surrounded by the internal vesical sphincter, a muscle made up of unstriated fibers.

Normally urinary leakage is prevented by the tonic contraction of the muscular apparatus of the membranous and prostatic urethra. When bladder distention occurs the internal vesical sphincter yields normally and the urine actually enters the posterior part of the prostatic urethra. This causes a desire to urinate and further control depends on the resistance action of the voluntary fibers of the external vesical sphincter and the compressor urethrae. A practical demonstration of the above process is shown in the apparent discrepancy in length of the prostatic urethra when the bladder is full and after it has been emptied. This is due to the fact that the posterior urethra once the bladder has been filled actually becomes a part of the bladder. Thus it may be seen that normally the major operation of urinary control and certainly the greater voluntary portion of it depends on the external sphincter. Any operative procedure which tends to destroy the function of this muscle is unwise and if the same results can be accomplished otherwise these means should be utilized.

In the original procedure for perineal prostatectomy described by Young the technique called for introduction of the tractor through an opening

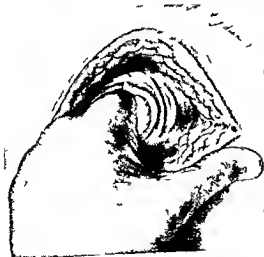


Fig 4 Separation of the adenoma externally by the finger after the dissection has been begun with a blunt instrument. The finger can be carried posteriorly to the adenoma and urethra.

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Fig 6 Sagittal section showing the finger carried internal to the adenoma and posteriorly between the adenoma and the urethra. The sound can be felt in the urethra. If there are firm adhesions or the lateral lobes are very large it may be necessary to divide through the adenoma at this point and remove it from each side.

ternal sphincter plus a destroyed external sphincter. This is the explanation of the dribbling and incontinence met with in many operations.

Numerous improvements have been suggested in perineal technique with a view to preserving the ejaculatory ducts; these do not cope with incontinence. However, Dillon has described a technique embodying aims similar to those presented herewith and reports good results.

The operation used by me since 1921 has been employed in 84 cases. It leaves both sphincters intact and the results are very satisfactory as regards permanent and satisfactory control.

TECHNIQUE

The perineum is made as far as possible parallel with the floor and the so-called exaggerated lithotomy position is most important. The incision is carried deeper in the center and the lateral fossae dissected free by blunt dissection. The central tendon is identified and incised up to the point of allowing the bulb to be retracted and

the transversus perinei muscle retracted posteriorly. At this point a special tractor that I have devised is introduced into the urethra and opened. This instrument was suggested by the Geraghty seminal vesical tractor. It has the prostatic cavity in it and yet opens in the bladder by means of the mechanism in the handle. The use of this instrument obviates the necessity of cutting into the membranous urethra in order to obtain traction. This is the first important point in the operative procedure.

The recto-urethralis muscle is then dissected free from the surface of the prostate by blunt dissection and the finger inserted into the area lateral to the prostate and the loose attachments of the gland freed up in this manner.

The capsule is then incised with parallel incisions well in the center of each lobe and at a safe distance from the prostatic incision. Enucleation of the lobe is then begun and the tissue is lifted away from the prostatic capsule. This enucleation is carried on until the finger passes posterior to the

CLINICAL SURGERY

FROM THE MAIO CLINIC

THE TECHNIQUE OF PARTIAL GASTRECTOMY FOR CANCER OF THE STOMACH¹

BY DONALD C BALFOUR MD FACS ROCHESTER MINNESOTA

PARTIAL gastrectomy whether for cancer ulcer, or some of the more rare lesions of the stomach such as benign tumor has been developed to a point where the dangers commonly fatal in the past have been practically eliminated. Various methods have been devised to lessen the operative risk and to simplify the technique of the operation. As Halpern has recently pointed out the methods conform to one or the other of two types—direct anastomosis between the end of the stomach and the duodenum, or closure of the duodenal stump and union of the remaining portion of the stomach with the first loop of the jejunum. The first type is usually called a modification of the Billroth I and the second a modification of the Billroth II. Many of the methods have survived because of certain merit. I shall not however attempt to discuss here their advantages but shall describe in detail the technique of the operation which is customarily carried out in the Clinic for cancer of the stomach and which is based on the principle of the Billroth II method.

The safety of operation for cancer partly depends on the selection of patients for operation, but a selection based on operative risk will not accomplish the greatest good for the greatest number. The fundamental principle in the surgical treatment of cancer of the stomach is that every patient is entitled to an exploration unless the disease can be proved incurable otherwise. This means that unless metastasis can be demonstrated or unless the fluoroscope reveals such definite involvement of the cardia that both the experienced roentgenologist and clinician realize that the lesion is irremovable exploration should be carried out. The observance of such a principle results in a resection of the growth in many instances when patients are in extremely serious condition.

The safety of partial gastrectomy for cancer of the stomach does not depend alone on the manner in which the operation is performed. Since many of the patients are poor surgical risks, no effort should be spared to get them in the best possible condition for operation. Unfortunately such a progressive disease does not permit of prolonged efforts to improve the patient's general condition although most gratifying results follow proper pre-operative measures earned out for a reasonable length of time, especially if retention is a complication. Patients with retention should be sent to a hospital lavage of the stomach carried out and fluids administered until the dehydration has been compensated. Extraordinary improvement has been effected in a few days in such cases and the mortality has been definitely lowered by the adoption of this routine. It is possible that patients with marked anaemia are benefited by transfusion although it is difficult to bring about any pronounced change in the haemoglobin percentage.

ANÆSTHESIA

In operations for cancer of the stomach anaesthesia is of first importance as a factor of safety. The danger of pulmonary complications is a serious one not only because the operation is in the upper abdomen but often because of the advanced age and poor general condition of the patient. The duration and character of the general anaesthesia should be the most innocuous possible. Regional block anaesthesia of the abdominal wall done as a routine will permit a considerable part of the operation being done without general anaesthesia and when the latter becomes necessary it need not be deep or prolonged.

Lavage is carried out preliminary to the operation and about half an hour before $\frac{1}{4}$ grain of morphine and $\frac{1}{150}$ grain of atropin is given.



Fig. 6. Sagittal section showing the finger carried internal to the adenoma and posteriorly between the adenoma and the urethra. The sound can be felt in the urethra. If there are firm adhesions or the lateral lobes are very large it may be necessary to divide through the adenoma at this point and remove it from each side.

ternal sphincter plus a destroyed external sphincter. This is the explanation of the dribbling and incontinence met with in many operations.

Numerous improvements have been suggested in perineal technique with a view to preserving the ejaculatory ducts; these do not cope with incontinence. However, Dillon has described a technique embodying aims similar to those presented herewith and reports good results.

The operation used by me since 1922 has been employed in 84 cases. It leaves both sphincters intact and the results are very satisfactory as regards permanent and satisfactory control.

TECHNIQUE

The perineum is made as far as possible parallel with the floor and the so-called exaggerated lithotomy position is most important. The incision is carried deeper in the center and the lateral fossae dissected free by blunt dissection. The central tendon is identified and incised up to the point of allowing the bulb to be retracted and

the transversus perinei muscle retracted posteriorly. At this point a special tractor that I have devised is introduced into the urethra and opened. This instrument was suggested by the Gerhardt seminal vesical tractor. It has the prostatic curve in it and yet opens in the bladder by means of the mechanism in the handle. The use of this instrument obviates the necessity of cutting into the membranous urethra in order to obtain traction. This is the first important point in the operative procedure.

The recto-urethralis muscle is then dissected free from the surface of the prostate by blunt dissection and the finger inserted into the area lateral to the prostate and the loose attachments of the gland freed up in this manner.

The capsule is then incised with parallel incisions well in the center of each lobe and at a safe distance from the prostatic incision. Enucleation of the lobe is then begun and the tissue is lifted away from the prostatic capsule. This enucleation is carried on until the finger passes posterior to the

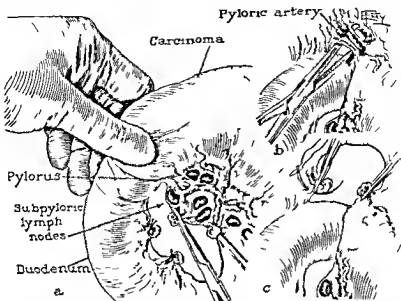


Fig 3 Space opened in the gastroduodenal omentum and division and ligation of the pyloric artery on the superior border of the duodenum

view appear to be irremovable are found to be suitable for resection and the patient is cured. This is particularly true of the colloid type of cancer in which the disease is sharply demarcated. If resection appears to be indicated the details of the operation are carried out in the following manner:

TECHNIQUE OF OPERATION

If the lesion is not firmly attached posteriorly and the duodenum is not infiltrated by inflam-

matory products the resection can well be begun at the pylorus. The finger is introduced through an opening in the gastrohepatic omentum behind the duodenum and pylorus and by traction the gastroduodenal omentum is put on the stretch. An area free from vessels and situated in the gastroduodenal omentum at the inferior border of the duodenum about 2 or 3 centimeters from the pylorus is then selected and forceps guided by the end of the finger introduced through this bloodless area to mark the site of the very lowest point of the

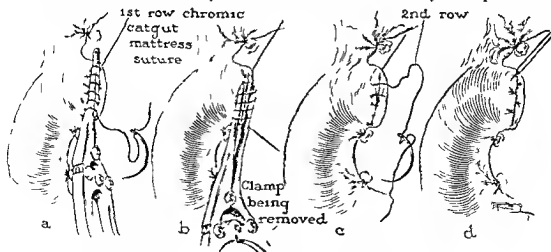


Fig 5 Closure of the duodenal stump after ligation of the pyloric and gastroduodenal vessels

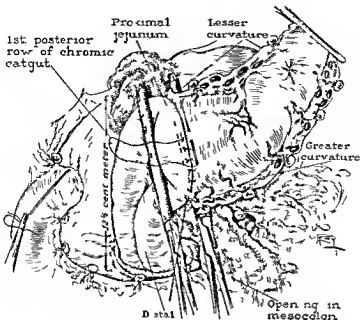


Fig 10 Arrangement of jejunum and stomach for posterior Pólya anastomosis

separation of the gastroduodenal omentum from the duodenum. The subpyloric group of lymph nodes is then mobilized and the gastroduodenal omentum divided on a line such that the entire lymph node area is included (Figs 2 and 3). After this portion of the gastroduodenal omentum is divided the gastroduodenal omentum is also divided by putting it on stretch by the finger a bloodless area being selected on the superior border of the duodenum far enough from the pylorus to remove a reasonable amount of the omental tissues bearing lymph nodes (Fig 3d). The procedures thus far carried out open up sufficient space behind the pylorus and the duodenum to introduce a pack (Fig 4) and also to permit the application of clamps.

Usually the duodenum can be mobilized so that the clamps can easily be placed on a sufficient stump of the duodenum to insure ready closure. When there are extensive inflammatory processes and infiltration of the disease into the pancreas there may be difficulty in mobilizing the duodenum and also in placing the clamps but if proper judgment has been used in attempting resection and sufficient care has been given to the mobilization of the duodenum the clamps can be so applied that closure is accomplished satisfactorily. After Pólya's clamp is applied the duodenum is divided the ends cleaned care

fully and the stump of the duodenum closed (Fig 5) with chromic catgut in a continuous mattress suture the clamp being included in the loops. After the first row of sutures is placed the clamp is removed and the sutures pulled taut. The second row is made like the first and the sutures tied. The end of catgut is left as a marker so that at the completion of the operation the closure may be reinforced by a surrounding tag of omentum.

Mobilization of the stomach and its omental attachments is now begun. First a wide strip of the gastroduodenal omentum is removed up to a point high enough on the greater curvature to be well away from the limits of the lesion (Fig 6). At this point it may be extremely advantageous to empty the stomach particularly if it is markedly ballooned by gas and retained fluids. The suction pump can be introduced through a small opening in the posterior wall and the opening closed afterward with a purse string of catgut (Fig 7). The gastroduodenal omentum is then divided. To insure the most thorough removal of adjacent lymph nodes it should be divided at as high a point as feasible in the individual case. If firm traction is made on the stomach by the assistant and the fingers of the surgeon's left hand support the gastroduodenal omentum (Fig 8) from its anterior aspect thus

ARTHRODESIS OF THE ANKLE

BY GEORGE F STRAUB MD FACS HONOLULU HAWAII
TH CI

WHEN the muscles of the leg are entirely or almost completely paralyzed the immediate result is flail ankle or drop foot frequently of the cavus variety and generally in slight varus position. The subsequent elongation of the paralyzed muscles and tendons and the stretching of the various joint capsules lead to a condition which at best is highly annoying to the patient and dangerous because in spite of the utmost care he is constantly in danger of stumbling and falling. The foot and ankle have absolutely no stability. This condition at times affects only the talocrural joint being here at least generally most apparent but in many instances extends to the talocalcaneonavicular and Chopart joints. In the latter case of course the result is more distressing.

For the treatment of the condition a number of methods have been considered and applied with more or less success. In this connection we shall have to mention (1) redressment with subsequent external fixation (2) orthopedic apparatus (3) arthrorrhaphy and tenorrhaphy with or without the insertion of artificial silk ligaments and (4) arthrodesis.

As to the first method there can be no doubt that thorough manipulation resulting in considerable traumatization of the joint surfaces and efficient wedging of a broad talus into a narrow intramalleolar space with subsequent prolonged fixation in plaster has in certain instances resulted in solid fibrous and even bony union between the joint surfaces. This however is the exception. The rule is recurrence of the drop foot immediately or later after discarding of the cast. There is also another consideration which makes the procedure appear dangerous and inadvisable. The necessary rough handling of the parts is very liable to lead to fat embolism. Besides in many cases especially in old patients it is impossible to reduce the talus into the intramalleolar space therefore some type of open operation becomes necessary.

The efficient orthopedic apparatus is expensive needs constant renewal is at best a clumsy weighty appliance and must be worn by the patient for life. If therefore we can offer him something less cumbersome in the long run less expensive and above all more efficient it is our duty to do so.

The third procedure recommended by Lange may be used with certain restrictions. This consists in operation on the tendon ligamentary and joint-capsular apparatus with stabilization of the joint by means of artificial silk ligaments. The chief consideration here must always be the sure prospect of giving the patient a permanently stable and serviceable foot without an orthopedic appliance. In very extensive or total paralysis of the leg muscles however, such a result is well nigh unattainable by these means and therefore cannot be promised to the patient.

Although I have not had any personal experience except the observation of Lange's results I must say that of all the methods of attacking the tendon ligamentary and capsular apparatus the artificial silk tendon as applied by that author appears to me the safest method, as far as immediate and permanent results are concerned. Silk is a material which is not subject to the vagaries of the body absorption elongation change of structure etc and provided it is imbedded absolutely sterile and the points of insertion are well chosen it will offer ideal chances for a good result. Unfortunately the technique does not lend itself to ordinary operating room conditions.

Thus by exclusion we arrive at the fourth possibility arthrodesis. All authors agree that this is perhaps the best method for the establishment of a really serviceable limb. If the operation is properly done true bony ankylosis of the talocrural and if necessary of the talocalcaneonavicular and the articulation tarsi transversa or Chopart's joint will re-establish to a remarkable degree the lost function of the ankle and leg. Under the conditions mentioned it will guarantee the greatest amount of stability and action. In passing it is interesting to note that the ingenious inventor of arthrodesis Albert as early as 1878 selected a case of paralytic pes equinus for one of the first performances of the procedure. He simply curetted the joint surfaces of the talocrural joint and fixed the foot in right angle position. Subsequently the operation was repeated by him and others with and without indication and with consequently more or less favorable results.

Arthrodesis the surgical fixation of a joint or artificial ankylosis must result in true bony

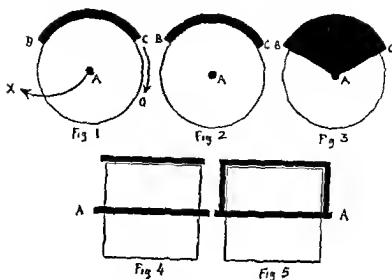


Fig 12 a Removal of stomach after first posterior suture line is completed b Beginning of second row posteriorly All coats included in suture

applied locking sutures at the lesser curvature. The stomach is then cut away and the mucosa carefully inspected for gross evidence of any remaining disease. The jejunum is opened and a second row of closely placed chromic catgut sutures is applied (Fig 12). This suture beginning at the greater curvature continues to the lesser curvature and takes in the full thickness of the edges of the jejunum and stomach. After the lesser curvature is turned the suture includes only the mucosal layer of the stomach and jejunum. When about one third of the anterior wall is sutured the rubber covered clamps are loosened and the posterior suture line is inspected to make certain that all bleeding is controlled the stomach is emptied of any secretions or blood that it may contain traction is made on the edges of the stomach and jejunum (Fig 13) the clamps are closed again and the first anterior row of sutures is continued to the greater curvature. The second row of continuous chromic catgut sutures is begun at the greater curvature and inverts the exposed and approximated mucosa. It then continues up to the lesser curva-

ture where it is tied to the first posterior suture and cut. The chromic catgut which is used for the first posterior suture line is continued anteriorly as a third row and tied at the greater curvature (Fig 14).

After completing the end-to-side anastomosis in this manner and making certain that hæmorrhage particularly in all omental tags is absolute one approximates the proximal and distal loops of jejunum at a point on a level with the duodeno-jejunal angle. An entero anastomosis is made at this point by a two row suture of chromic catgut (Fig 15). The opening does not need to be large since its only purpose is to drain the proximal loop and prevent retention of the contents of this long loop. In carcinoma there is certainly no objection to this entero-anastomosis and it is of considerable advantage. In ulcer there may be theoretical disadvantages enough to outweigh the advantages in diverting alkaline secretions from the stomach. However there is no direct evidence even in gastric ulcer that such anastomosis interferes with an otherwise good result. The loops of intestine are now arranged



(3) used a periosteal bone flap on the anterior surface of the tibia thus bridging the talocrural joint in front. In addition he made extensive use of tenodesis and fasciodesis.

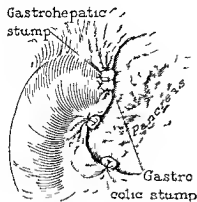
The two modifications mentioned last lead us to the third class of methods in which free bone grafts or foreign materials are employed. Leter (8 p) since 1900 has practiced arthrodesis of the ankle by way of the bone dowel method. He took the material for this purpose from the fibula of the same patient but also from freshly amputated limbs and macerated bone from human cadavers. The bone dowel is driven from an incision on the sole of the foot through the calcaneus upward via the joint into the lower end of the tibia. As was to be expected the material in course of time was absorbed as far as it was exposed within the joint and the immediate ankylosis which to my mind was chiefly due to the traumatic arthritis caused by the penetration of the foreign body gradually disappeared. The same thing holds good for the doweling of the joint by Brude's method. The operation known as Wrede's while using the talus as a free bone transplant is in fact nothing but an arthrodesis of all the joints surrounding that bone with very thorough removal of the joint lining structures. Kosirski (6) lately has advised the application of a rib transplant.

As to the results of arthrodesis of the ankle joint Vulpius (17) is author of the statement that in about 50 to 60 per cent of the cases the achievement is bony ankylosis that in another

20 to 25 per cent fibrous union is obtained and that in the rest there is more or less complete failure. These figures correspond fairly well with those given earlier by Karasiewicz. The fact that these statements are repeated over and over in the literature in articles and textbooks goes to show that the experience of other authors coincides with that of Vulpius and that therefore the figures laid down represent a fair evaluation of the final result of the procedure under consideration.

An analysis of the results shows that there are two factors which are chiefly responsible for success: first, the painstaking removal of cartilage and synovial membrane and second, the intimate apposition of the vivified surfaces. The first point has been mentioned before and also has been emphasized in an earlier article by the author (16) on arthrodesis of the shoulder joint. The second point is based on the simple physiological principle that close apposition makes for rapid vascularization and reconstruction of the tissues concerned in the process of wound healing. The second factor of course depends not only upon properly performed arthrodesis but also upon immobilization of the raw joint surfaces by setting of the tendons and fascias and last but not least on the careful application of the first plaster cast and sufficiently prolonged post-operative immobilization.

The point last mentioned of intimate apposition has for some time past occupied the minds of some surgeons and has taken the form of the problem. By what means can the loss of



1 16 Stump of duodenum covered by the gastrocolic and gastrohepatic omental top

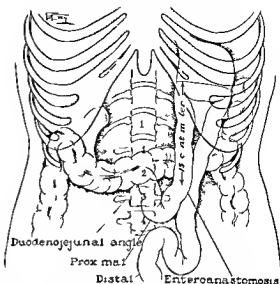


Fig 17 The relation of parts after the completion of an antecolic end to side anastomosis with an enteroanastomosis

retention be avoided. Rarely does retention occur with this type of anastomosis but patients greatly appreciate the comfort which follows lavage of the stomach. The majority of patients are more comfortable if they are in a semi sitting position in bed although this posture should not be made a rule. They should be permitted to assume any position they prefer. Fluids are maintained by proctoclysis at least 2000 cubic centimeters of plain water should be introduced daily.

The comfort and possibly the safety of the patient are enhanced by withholding fluids by mouth for at least 48 hours after operation and unless thirst is complained of which is unusual because adequate amounts of fluid are administered in other ways fluids by mouth need not be given until the third or fourth day after operation. I have seen no disadvantages in this plan. Morphine is given as needed but it

is rarely necessary after the first twenty four hours and in many cases none is required. The majority of patients are permitted to get up on the eighth ninth or tenth day.

MORTALITY

Without cases being selected on the basis of operative risk the mortality for partial gastrectomy in cancer should be under 10 per cent. During 1936 partial gastrectomy was performed 120 times in the Clinic for malignant disease of the stomach and nine deaths resulted a mortality of 7.5 per cent.



Fig. 9 (left) Roentgenogram made 3 months after operation showing bone graft in talus

Fig. 10 Roentgenogram made 3 months after operation lateral view

area ABC representing the inner surface of the malleoli. Here, in addition to the conditions shown in Figure 2 ABC illustrates the great increase in contact surface. Figures 4 and 5 are cross sections of 2 and 3 respectively and also show the considerable increase in contact surface effected by close apposition of both malleoli.

Bearing all the foregoing considerations in mind I have elaborated and in a number of cases successfully applied a method of arthrodesis of the ankle joint which in my opinion is as sure of a good result as any surgical method can be and which in addition, is not difficult of performance although the technique must be carefully and painstakingly followed.

The mode of procedure is as follows. An Esmarch bandage is applied at the thigh. The

ankle and foot are in position of extension. The incision (Fig. 6) starts over the lateral aspect of the fibula between the peroneus brevis and the extensor digitorum longus about 8 centimeters above the tip of the malleolus externus. From there it proceeds slightly backward to a point about 1 centimeter behind the malleolus then commences to curve forward to a point halfway between the tip of the malleolus and the tuberositas ossis metatarsalis V and finally continues in a gentle curve across the dorsum of the foot ending at a point a little beyond the highest prominence of the instep which corresponds to about the midpoint of the articulation of the first and second cuneiform process and the second metatarsal. The incision penetrates through the skin with its vessels and nerves severing the nervi cutaneus dorsalis pedis lateralis, intermedius and a branch of the nervi cutaneus medialis. This results generally in a temporary numbness of the third, fourth and fifth toe. The skin flap is carefully dissected back leaving exposed the thin fascia covering the tendon sheaths and the fascial reinforcement. The division of the retinaculum peroneorum superius inferius and the latter's continuation the ligamentum cruciatum frees the tendons of the peroneus longus and brevis. These tendons are generally best divided at this stage of the operation. The tendon of the peroneus tertius is cut next. The tendons of the extensor digitorum longus and extensor hallucis longus are with the ligamentum cruciatum dissected off and retracted toward the



Fig. 11

Fig. 12

Fig. 13

Fig. 14

Fig. 11 Roentgenogram made 4 months after operation

Fig. 12 Roentgenogram made 8 months after operation graft still visible osteoplastic fusion of joint distinctly appearing especially on malleoli

Fig. 13 Roentgenogram made 20 months after operation the outlines of the bone graft are shown to be disappearing

Fig. 14 Roentgenogram made 25 months after operation fusion complete



Fig. 1. Roentgenogram made in January 1926 of case of Pott's disease on the right. A celluloid splint 15 centimeters long on the left one of rust proof steel



Fig. 2. O. Mayer. Spondylitis of the (1) breast and (2) lumbar vertebrae. Operation in June 1927. 2 celluloid splints 25 centimeters in length were implanted. This photograph was made 5 years after the operation and shows how little the motion of the spinal column has been limited.

rhage described above there is only one thing to be guarded against carefully. When the needle is pushed through the interspinous ligament the operator has to be careful not to go through the deeper parts of the ligament for fear of getting into the vertebral canal and damaging the cord.

After the operation the duration of which should not exceed $\frac{1}{2}$ to 1 hour we have met at times a weakness and a small pulse from patients who have already had a miserable habitus. In such cases we have administered repeated saline infusions through the rectum for 3 or 4 days.

As a rule we dismiss the patient from the hospital after 2 months after which period ambulatory treatment is given.

I am glad to say that to date the mortality from this operation has been nil. Complications were met with in 5 cases only. In these cases I was compelled to remove the implanted splints. This was due to faulty technique at the experimental stage of the newly introduced operation. In an endeavor to improve the gibbosity I had prepared the splints a little too straight and not quite corresponding with the curve of the hump. The result was that the ends of the splints were slightly springy and therefore endangered the skin. Although this idea proved to be an ad-

vantage and an absolute success in 6 cases in which I managed to improve the grade of the gibbosity it had on the other hand the disadvantage in the 5 cases mentioned of causing the skin to break thus compelling me to remove the splints. After these unfortunate mishaps I have made it a practice to fit the splints exactly to the form of the gibbosity and to be sure even to bend the ends of the splints a little downward. Since I have taken this precaution none of the patients has had bed sores.

POSTOPERATIVE CARE AND TREATMENT

After the patient has remained in his plaster of Paris dressing for 6 weeks he receives a properly fitted corset and can get up but he must wear the corset for a period of 2 years. This double support to the vertebral column is desirable as I have found that at least a year is required for the splints to be surrounded with real firm resistant tissue.

PROGNOSIS

To what extent have we succeeded in checking the progress of the growth? A positive and honest

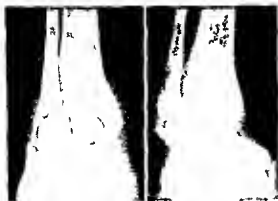


Fig. 19 (left) Roentgenogram taken 2 months after operation. Bone graft well outlined.

Fig. 20 Roentgenogram taken 10 months after operation. Excellent fusion. Outline of graft just disappearing.

sufficient thickness to fill snugly the gap and to assure close apposition between the talus and the former joint surfaces of the malfeas. This completes the most essential part of the operation.

The shortening of the talus resulting from removal of the graft is inconsequential as far as appearance or function of the tarsus is concerned. To prevent excessive adduction of the forefoot it may be advisable to go a little further in removing the joint surfaces of the calcaneoeuoid joint.

Now follows the closure of the various layers of the wound. A few sutures of thin catgut inserted into the ligaments assure preliminary apposition of the bones. It has already been mentioned that occasionally achillotomomy has to be done to bring the foot into the proper position. This of course is done before the operation proper is begun. I have also mentioned that in arthrodesis I rely chiefly on the proper bony union and that I see in the fixation by surrounding structures not much more than a temporary help which holds the joint in the proper position until my aim bony union has been achieved. Therefore while not discarding fasciodesis and tenodesis I make only such use of it as I consider suitable to the occasion. In the case under consideration for instance I simply reef the tendon of the tibialis anterior and reunite the peroneus tendons at the proper tension. In order not to cause later deformity of the toes the best judgment must be used in the reefing of the long extensor digitorum and extensor hallucis and the suturing into place of the short extensors. This is especially true when traces of action are left in any of the muscles of the leg as happens frequently.

After all these structures are sutured into place with as little and as fine suturing material as possible and after complete hæmostasis is secured the skin wound is closed with fine catgut and a light plaster cast is applied. This is placed in the desired position and reaches from the tuberositas tibiae to the toes. The Esmarch bandage is removed and the leg kept in an elevated position for at least 24 hours to minimize subsequent oozing from the bones.

Regarding the position in which the ankylosis is to be effected most authors favor slight plantar flexion. Steindler in the article mentioned advises $3/4$ to 1 inch plantar flexion. Jones (3) however basing his opinion on the follow up of numerous war injuries is of the opinion that a few degrees of more acute dorsiflexion than right angle enables the patient to walk with a minimum of strain on the forepart of the foot. I believe that there is no such thing as a standard position and that each case has to be judged on its own requirements. The chief determining factor is the kind of footwear to which the patient is used. Low heels require a position near right angle. High heels a few more degrees of plantar flexion while for walking with bare feet the observation of Jones may justify a small degree of dorsiflexion. As a rule I put the foot in slight varus position.

The first plaster cast remains in place for 8 weeks and is then replaced by a very light walking cast which remains in place for another 8 weeks. Slight attempts at walking of course with crutches and weight bearing 2 months after the operation. I believe is a distinct advantage in so far as it hastens consolidation and ankylosis.

It hardly needs mention that the type of operation described should not be performed before adolescence when the ossification centers will have developed into sufficient size to be of value for a bone graft operation. This principle holds good even more for the author's procedure than for a simple arthrodesis which according to Lorenz (10) should not be done before adolescence according to Vulpius (18) not before the eighth to tenth year and is absolutely untrustworthy before the sixth year according to Albee's (2) opinion.

In explanation of the roentgenograms and photographs appearing in this article I shall quote short histories of 2 cases.

CASE 1 J. L. B. female 31 married at the age of 20 months had poliomyelitis anterior resulting in paralysis of the left arm and leg. For 2 years the patient was absolutely disabled. The paralysis gradually subsided with the exception of all the muscles moving the left ankle and

A NEW TECHNIQUE FOR PERINEAL PROSTATECTOMY WITH PRESERVATION OF THE EXTERNAL SPHINCTER¹

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THE preference for suprapubic prostatectomy over perineal methods of removal may be ascribed to two reasons. The first is the technical difficulties of the perineal method; surgeons unless especially trained in perineal technique find it very difficult or are unwilling to carry out a procedure of which they feel less sure than suprapubic prostatectomy.

Secondly, incontinence has been an annoying factor and a source of great complaint in the after conduct of the case. This to many is sufficient reason for discarding the perineal route for the suprapubic approach. This incontinence usually does not occur immediately after operation and to be sure variations in technique may account for a variety of results. Admitting however that it is met with there is opportunity for the improved operative procedure described in this paper.

Incontinence is a relative term and with respect to its occurrence after perineal prostatectomy reference is made to all degrees from dribbling, extreme urgency, lack of control separate from anal control—to complete incontinence. This latter is seldom met with but the other conditions are often seen.

The control of the urine depends on the integrity of both the internal and external urethral sphincters. In the development of a prostatic hypertrophy the enlargement may extend into the rectum or forward around the urethra. In a third type where there is marked bladder intrusion certain changes take place in the internal sphincter that are of much practical importance. This intrusion of the prostate goes on until the circumference of the sphincter is increased three or four times. Following complete retention and still greater distention the sphincter vesicle and compressor urethra muscles have insufficient strength left and yield to the pressure so that the urine overflows more or less continually, the so-called incontinence of retention. It is obvious therefore that in an operation for the removal of the prostate in this type of case in which the external sphincter has been severed and destroyed the internal sphincter is insufficient to give the patient satisfactory urinary control. This internal sphincter encircles the first por-

tion of the urethra and is derived from the deeper muscular layer of the trigone muscles of the adjacent bladder wall do not enter into its productions. The external vesical sphincter is quite a different structure. It begins around the apex of the prostate and encircles the urethra in the form of bundles of striped muscle. Anteriorly the bundles lie in front of the urethra. Below the sphincter is combined with the compressor urethra muscle and may be regarded as a prolonga-

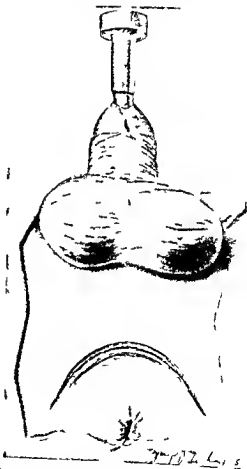


Fig. 1. Showing retractor in place and curved incision carried deeper in center.

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TRAUMATIC RUPTURE OF THE DIAPHRAGM¹

REPORT OF A CASE WITH RECOVERY FOLLOWING OPERATION

By WILLIAM E SHACKLETON M D KALAMAZOO MICHIGAN

THE number of cases of rupture of the diaphragm with herniation of abdominal viscera into the thoracic cavity which have been cured by surgical intervention is so small as to justify the report of an additional case.

The spectacular case reported serves to call our attention to a surgical condition described by Ambrose Pare in 1610 (1). He reported 2 cases of traumatic diaphragmatic hernia as did Fabricius Hildanus in 1646 (2) while the first congenital case was reported by Ruvenius Lazars in 1689 (3).

Although the possibility of rupture of the diaphragm has been known for centuries the condition is seldom recognized. Modern text books dismiss the subject with a brief paragraph acknowledging its existence. Even the modern surgical diagnosis of De Quervain (5) states that diaphragmatic hernia is seldom suspected before operation unless previous injury has suggested its possibility. Binnie in 1914 could find only 2 cases cured by radical operation.

The mortality is high. However with the aid of modern radiological studies made along the lines laid down by J M Woodburn Monson (4) more favorable results should be obtained. The condition can now be recognized before cases come to autopsy or operation in the non traumatic as well as in the traumatic cases.

There are many classifications of diaphragmatic hernia a workable one by Richards (7) may be cited.

- 1 True hernia (having a hernial sac)
 - a Congenital
 - b Acquired
- 2 False hernia (without hernial sac)
 - a Congenital
 - b Acquired
- 3 Eventration of the diaphragm

There are 4 types of hernia those in which herniation occurs through (1) the space of Morgagni (2) the dome or (3) the esophageal opening and (4) those in which herniation is due to the absence of part of the diaphragm. Hume (6) in reporting 35 cases found the distribution of cases 1 18 12 and 4 for the 4 types in the order named. The hernia is found on the left side six times as frequently as it is found on the right.

Healy (8) states that the aortic opening has never been known to contain a hernia. Therefore the esophageal opening is the only muscular opening amenable to dilatation. In 53 cases all of the esophageal opening the hernia was usually behind the esophagus and varied in size from an English walnut to a large grapefruit. In 1 case two thirds of the stomach had passed through the opening.

The symptoms present a wide range of variations. In cases of eventration of the diaphragm or absence of part of the diaphragm there may be an entire absence of clinical symptoms or a vague indefinite history of indigestion. Other cases give a history of epigastric discomfort.

A NEW TECHNIQUE FOR PERINEAL PROSTATECTOMY WITH PRESERVATION OF THE EXTERNAL SPHINCTER¹

By JOHN H. MORRISSEY, M.D., F.A.C.S., New York

From the Jefferson Medical College, Philadelphia

THE preference for suprapubic prostatectomy over perineal methods of removal may be ascribed to two reasons. The first is the technical difficulties of the perineal method; surgeons unless especially trained in perineal technique find it very difficult or are unwilling to carry out a procedure of which they feel less sure than suprapubic prostatectomy.

Secondly, incontinence has been an annoying factor and a source of great complaint in the after conduct of the case. This to many is sufficient reason for discarding the perineal route for the suprapubic approach. This incontinence usually does not occur immediately after operation and to be sure variations in technique may account for a variety of results. Admitting however that it is met with there is opportunity for the improved operative procedure described in this paper.

Incontinence is a relative term and with respect to its occurrence after perineal prostatectomy reference is made to all degrees from dribbling extreme urgency lack of control separate from anal control—to complete incontinence. This latter is seldom met with but the other conditions are often seen.

The control of the urine depends on the integrity of both the internal and external urethral sphincters. In the development of a prostatic hypertrophy the enlargement may extend into the rectum or forward around the urethra. In a third type where there is marked bladder intrusion certain changes take place in the internal sphincter that are of much practical importance. This intrusion of the prostate goes on until the circumference of the sphincter is increased three or four times. Following complete retention and still greater distention the sphincter vesicle and compressor urethra muscles have insufficient strength left and yield to the pressure so that the urine overflows more or less continually the so-called incontinence of retention. It is obvious therefore that in an operation for the removal of the prostate in this type of case in which the external sphincter has been severed and destroyed the internal sphincter is insufficient to give the patient satisfactory urinary control. This internal sphincter encircles the first por-

tion of the urethra and is derived from the deeper muscular layer of the trigone muscles of the adjacent bladder wall do not enter into its productions. The external vesical sphincter is quite a different structure. It begins around the apex of the prostate and encircles the urethra in the form of bundles of striped muscle. Anteriorly the bundles lie in front of the urethra. Below the sphincter is combined with the compressor urethra muscle and may be regarded as a prolonga-

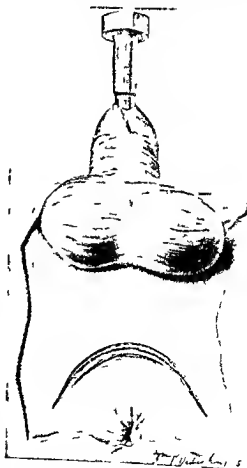


Fig. 1. Showing retractor in place and curved incision carried deeper in center.

CASE REPORT

A C. male age 9 while wrestling experienced sudden severe pain in the left upper side of the abdomen. Dyspnea and symptoms of shock rapidly ensued.

At the time of examination 2 hours after the onset of pain the face was ashen gray, the skin cold and moist. The pulse rate was 160 and respiration jerky. He was lying on his right side with the knees flexed on the abdomen and the entire body flexed as much as possible. It was impossible to alter this position without greatly increasing the pain. Examination therefore was difficult. The heart was displaced to the right of the sternum. The left side of the chest below the third interspace and back was hyperresonant and breath sounds were absent. There was no bubbling or gurgling on auscultation over the left chest. Examination of the right side of the chest was negative except for the cardiac displacement. There was tenderness and light rigidity of the left upper quadrant of the abdomen, but no dullness in the flanks.

The diagnosis seemed to rest between rupture of the diaphragm and acute pneumothorax. The evidence as to possibility of other complications such as rupture of the spleen or other abdominal viscus but the absence of diffuse abdominal rigidity and dullness in the flanks rendered such a serious injury improbable. Tenderness in the upper left abdomen with extreme pain under the costal margin without gross evidence of fractured ribs did not fit into the picture of a pneumothorax, therefore in spite of the absence of splashing or gurgling a diagnosis of ruptured diaphragm with displacement of the stomach was made.

The patient was given morphine and removed to a hospital for X-ray study. It was proposed to operate if the diagnosis could be confirmed.

Padographic examination was made by Drs. Crane and Jackson. The patient was first observed under the fluoroscope. The heart shadow was much displaced to the right. There was an area of markedly decreased density in the areas ordinarily occupied by the left lung.

Stereoscopic films were made with the patient in the supine position. They showed a shadow in the lower left chest occupying the area from the level of the third rib in front and the sixth rib behind down to the diaphragm. The line of the diaphragm could not be seen. The edge of what appeared to be an air-containing sac could be followed along the chest wall down to the normal point for attachment of the diaphragm.

A barium meal was given and stereoscopic films were made with the patient in the supine position. They showed the stomach within the chest cavity, the barium having settled into the posterior portion. The barium could not be made to pass on through to the pyloric end of the stomach.

Films were made with the patient in two positions in an effort to fill with barium the entire gas-containing area of the viscus and the pyloric end of the stomach.

These films showed that the stomach to a large extent lay in the chest cavity and that the pyloric end of the stomach was shut off from communication with the herniated portion.

The X-ray diagnosis was a diaphragmatic hernia of a large portion of the stomach.

Under nitrous oxide and oxygen anesthesia with the patient in a semi-upright position 5 inches of the eighth and ninth ribs were resected beginning at the posterior angle and passing forward. When the pleural cavity was opened omentum protruded from the incision and when the incision was lengthened the pleen and colon and then the stomach appeared—all in the pleural cavity.

The abdominal organs entered the left chest by way of a rent which began at the posterior angle of the tenth rib and passed forward along the chest wall for a distance of 3 inches. It seemed to be a separation of the diaphragm from the chest wall without much injury to the muscle, although torn fibers could be observed at the anterior end.

Some difficulty was experienced in replacing the organs in the abdomen after which the diaphragm was sutured to the chest wall. The incision was closed without drainage.

The condition improved greatly following the operation. The mouth temperature was from 100 to 103.4 degrees Fahrenheit for 3 or 4 days. On the third day following operation evidence of a slight amount of fluid in the left chest was confirmed by X-ray examination which also showed clouding suggesting a localized pneumonic process in the right lung. Fever however was the only clinical evidence of pneumonia which had elapsed. The patient continued to improve rapidly and was discharged in good condition on the thirteenth day. Examination at that time showed a decrease in the amount of fluid in the left chest, the apex of the heart could be felt 2 fingers breadth to the left of the sternum in the fifth interspace, the left lung seemed to be expanding. X-ray examination again confirmed the clinical findings.

Recent reports from Dr. Hudson to the family physician state that the boy is apparently as well as ever.

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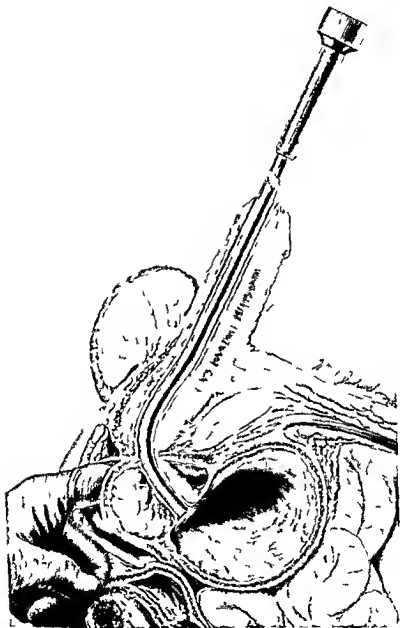


Fig 5 Sagittal section showing the finger carried as in Figure 4 and the adenoma being separated from the capsul proper

in the urethra anteriorly to the apex of the prostate. Thus severed the fibers of the external sphincter. The relative degree of continence following these operations at least in those cases in which complete control has been superseded by incontinence is due to the fact that the scar

following the division of these fibers is usually sufficient to give control. However absorption of this scar eventually takes place and if the internal sphincter is not strong or if its function in any way has been destroyed or interfered with, then we have the situation of an incomplete in

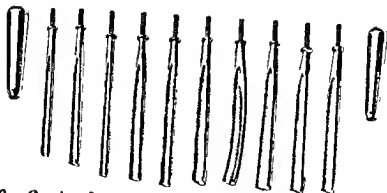


Fig 4 Illustrating chisels in actual size and a few specimens of the shapes which may be cut with these instruments

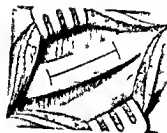
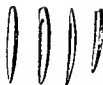


Fig 5

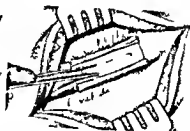


Fig 6

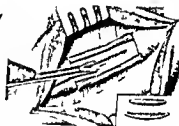


Fig 7

Fig 5 Showing exposure of rib with incisions made in the perichondrium

Fig 6 Removing cartilage for simple transplant

Fig 7 Showing the method of removing the cartilage for the cases in which the cartilage is required to be grooved

proved the best substitute and after trying my skill on a number of turnips using first one chisel and then two chisels of different sizes I found I could cut a piece of turnip similar to the size shape and thickness of a piece of cartilage needed for nearly any case requiring a cartilage transplant

Going back to the cadavers I found that the chisels worked just as well on the costal cartilage except that a little more force had to be used

A large piece of cartilage might be tunneled to fit the nasal bone or beveled to fit the frontal bone It might be thin on the end thick in the center or vice versa with a contour similar to that of the normal nose This could be accomplished before the piece of cartilage was completely removed from the sternum This did away with

the old method of getting a piece of cartilage by the use of a knife elevator and a pair of forceps and then attempting to shape it with various instruments at the time of operation a procedure very often requiring much time during which the patient is under an anesthetic

It was also evident that the shapes removed by one or more chisels might be used for purposes such as the complete or partial reconstruction of a nose the reconstruction of an ear the formation of eyelids postoperative frontal sinuses deformities elevation of depressed scars and the tunneling of soft tissue

The number of chisels in the set at this time is ten They are illustrated in full size in the drawing They have been nickel plated and threaded on their shanks to fit the handles shown As it is

adenoma and posteriorly to the urethra into the opposite prostatic lobe. The procedure is then repeated on the opposite side. Following this the removal of the lobe from the prostatic urethra is begun. This is accomplished with considerable difficulty when there has been a marked degree of inflammation. There are usually firm inflammatory adhesions between the urethra and the lobe of adenoma and it is generally impossible to separate these entirely without tearing into the urethra at this point. Injury to the prostatic urethra occurs in almost 75 per cent of the cases. The injury is however inconsequential and heals rapidly. In addition it can be used as an entrance for a catheter to the bladder and the bladder drainage carried out in this manner. If the prostatic urethra is not torn but accidentally opened the catheter must be passed from the meatus directly into the bladder. The prostatic capsule is then packed with gauze, the levator ani muscles brought together and the skin wound closed with silk worm gut sutures. When a marked suburethral enlargement occurs this obstruction can be removed generally by sharp dissection.

With 5 exceptions operation in the 83 cases was done under regional anesthesia: sacral and parasacral and the usual aftercare followed. Preliminary care of course follows the usual lines: namely attention to the blood chemical findings and the phenolsulphonephthalein tests. The patients are out of bed sitting up for a short time the third day after operation and are induced to walk about the seventh or eighth day. The results have been most satisfactory. In only 1 case have I had any incontinence whatever and this patient had a 4+ Wassermann. He presented the somewhat complicated picture of complete continence by night and moderate incontinence during the day. He had already had one operation for removal of a large bladder stone and there was a tendency for stones to reform in the prostatic urethra and prostatic sulcus. However this patient is rapidly developing control. One patient made the surprising record of leaving the hospital 12 days after operation. He had perfect control and this has existed from the date of discharge. It is better to drain the bladder from the perineal sinus as this spares a certain amount of absorption from the urethra. There is no point in opening the urethra when a rupture has not occurred.

Epididymitis noted as a frequent complication in patients convalescing after operations on the prostate was met with in but 3 cases before the patient left the hospital. However 10 patients developed symptoms in the testicle with swelling and pain in the epididymis after leaving the

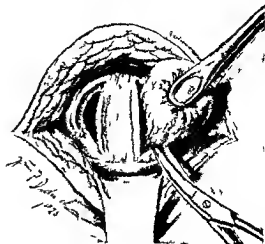


Fig. 1 Removal of one lateral lobe after the opposite side with the posterior commissure has been removed. No preservation of center portion of capsule containing the ejaculatory ducts and other structures in the floor of the urethra.

hospital. In these cases the epididymitis occurred from the third to the fifth week after operation. I am unable to explain the disturbed time relation. The preservation of the posterior and prostatic urethra during the perineal procedure seem however of considerable effect in preventing this.

In perineal operations for carcinoma of the prostate this method cannot be advised. Lack of control has not seemed to have been a difficulty in such cases. If the urethra is torn and sphincter muscles injured the carcinoma usually grows at a sufficiently rapid rate to provide a sphincter and dilatation is often necessary. Perineal procedures in these cases should be as extensive as possible with a view to removing all obstruction and not so line a regard for the preservation of strict anatomical features of bladder control and sexual ability need be observed.

CONCLUSIONS

1. Incontinence is a complication of perineal prostatectomy in a fairly large percentage of cases.
2. This is due to variations and difficulties of technique.
3. Damage to the internal sphincter prior to operation makes preservation of the external sphincter essential.
4. The technique described above is designed to preserve the external sphincter intact.
5. Perfect urinary control may be expected if the technique is followed carefully.

ETHYLENE-OXYGEN ANÆSTHESIA

A REPORT OF 2 750 CASES

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SINCE the experimental and clinical studies of Luckhardt and Carter (9 and 10) and Brown (1 and 2) demonstrated in 1922 the possibilities of ethylene oxygen as a general anæsthetic its value has become fairly widely accepted although many objections have been raised against its use and some dangers pointed out. We have felt that a critical review of its use in 2 750 consecutive cases might aid in establishing its proper place in relation to the other general anæsthetic mediums.

An effort has been made to evaluate its special advantages or disadvantages which might be evident during or following the period of anæsthesia. No attempt to select certain particularly favorable types of cases has been made. It has been used in a great variety of operations from minor surgical procedures to the more extensive major operations. These have included general surgical gynecological urological orthopedic and otolaryngological operations.

The anæsthetics were for the most part administered by professional trained nurse anæsthetists although about twenty per cent of the anæsthetics reviewed were given under supervision by junior members of the surgical staff.

The same machines¹ formerly utilized for nitrous oxide oxygen administration have been used without the addition of any special safety devices or attachments as suggested by Luckhardt (7) and by Lewis and Boehm (6).

Ethylene manufactured by a manufacturer of chemicals has been used and found quite satisfactory. Luckhardt's (8) warning however that the production of ethylene on a commercial basis might result in a gas less pure than that produced in the experimental laboratory must be borne in mind.

At times there was noted a difference in the rate of induction and in the severity of the postoperative nausea with the use of various shipments of the gas. This might quite readily be attributed to minor variations in the relative purity of the ethylene but on this we have no exact data. It is true however that the oily residue which collects in the reducing diaphragm is variable in amount and that the usual colorless

gas occasionally has a light blue smoky appearance.

EXPLOSIBILITY

The most serious objection to the use of ethylene oxygen is its explosibility. According to Brown (2) the maximal explosibility is reached when the proportion is 15 of oxygen to 1 of ethylene. This same observer has pointed out however that for the atmosphere of an operating room to become saturated with such an explosive mixture it would require an unheard of and prodigious escape of ethylene. Brown has reported further that a minimum of 40 to 45 per cent of oxygen is required for an explosive mixture and that the explosibility increases with higher percentages of oxygen. He states (3) that in a room of 2 700 cubic feet at least 6 hours of continuous anæsthesia would be required to result in an atmospheric ethylene content of from 5 to 10 per cent sufficient to result in an explosive mixture.

By reason of its weight the gas does not diffuse very rapidly and may hang as an almost or entirely invisible cloud in a quiet room following its escape. It is therefore quite true that the use of free flame X-ray machines electric fans and actual cauteries is extremely dangerous. When the latter are essential there is no middle ground and another type of anæsthesia must be used. These sources of danger can easily be eliminated.

The static spark however resulting as it does from differences in electrical potential of two charged bodies brought into close proximity has been the subject of much debate in its relation to ethylene both as to its being a real source of danger and as to means by which this danger can be eliminated. We have demonstrated with an electroscope that this difference in potential between bodies both animate and inanimate does exist in a greatly varying degree. The discharge that may occur between these bodies furnishes an ever present source of danger provided precautions are not taken against it. More or less elaborate means of grounding the tables machines doctors nurses and attendants have been devised and are theoretically effective (6 and 7). The very elaborateness of some of these protective mechanisms has to a certain extent argued against

union of the joint surfaces. This is impossible as long as there is any macroscopically perceptible amount of cartilage left covering the joint surfaces and as long as any secreting synovial membrane remains. Success is also highly improbable before puberty, as before that age there is not sufficient ossification of the tarsal bones to insure vigorous osteoplastic action. Therefore most scrupulous removal of all the hyaline cartilage and synovial membrane is the *sine qua non* of success of the operation. The age must be properly chosen. Epiphyseal lines must not be injured by the procedure. Furthermore it goes without saying that eventual contractures should be corrected before the operation by manipulation, achillectomy, division of the plantar fascia, etc. The functional aim must be usefulness of the limb without apparatus of any sort.

When we come to a discussion of the means available for the arthrodesis of the ankle we have to mention a variety of methods which in the hands of the various authors have given more or less satisfactory results.

Before proceeding with the methods proper for the production of ankylosis of the ankle I must make a few remarks on astragalectomy as related to the subject under consideration. Whutman originally designed the operation for the relief of pes calcaneovalgus. Up to this date nobody has even attempted to dispute the ingenuity and propriety of the procedure if it is restricted to the correction of the condition for which it was planned. Here certain mechanical requirements are admirably and positively satisfied. But when in more recent times we observe that astragalectomy is being hailed as a panacea for all sorts of deformities and among others of unstable dangle foot it is about time to closely scrutinize the results. It is true that astragalectomy produces stability and at times preserves the motility of the ankle. But why preserve a movable ankle if there are no muscles to move it? Is not successful arthrodesis sufficient when the forefoot has a certain amount of motility and resiliency left? Astragalectomy has always appeared to me to be a mutilating operation at best resulting in a definite amount of shortening of the extremity and a disfigurement of the foot—in other words a poor cosmetic result. This of course serves a very definite purpose if the operation is done with the indication originally laid down by its author. In all other cases observed by me the gain as compared with the results of other procedures is out of all proportion to the sacrifice in bone and appearance. Many

patients with bad postoperative cosmetic result and limping gait bear witness to an astragalectomy based on lack of consideration for proper mechanical requirements. Complete paralytic equinovarus to my mind cannot be considered together with the subject of astragalectomy.

The proper methods for arthrodesis may be divided into

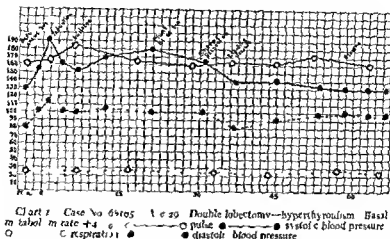
1. Methods in which the attack is on the joint surfaces only

2. Those which add to this reinforcement (a) by fasciodesis or tenodesis or both and (b) by pedunculated periosteal bone flaps

3. Methods employing free bone grafts (autogenous and heterogenous) or foreign material (nails, ivory pegs, etc.)

In the methods under heading 1 the approach to the operative field is similar to that used for erosion or resection of the ankle joints. Kocher's lateral incision is preferable for this purpose. Lauenstein (2), Koenig, Albanese, Ochsner (12) and others have devised modifications of this method to suit individual conditions. But Kocher's method on the whole gives very satisfactory access to the operative area. The joint is opened and by forcing the foot into strong varus position the talus is gradually exposed. After thorough removal of all cartilage and synovial membrane from the talus itself the lower end of the tibia and fibula and the inside of the malleoli the bones may be put into intimate apposition and the wound closed. The result is fibrous or even possible bony ankylosis of the talocrural joint. If it should be desirable to treat the adjoining joints in the same manner the Kocher incision will in most cases give fairly good access. Steindler (15) in a recent article describes a modification of this type of operation which he has used in a considerable number of cases with good results. It consists of a fusion of all the joints of the ankle with the exception of the calcaneocuboid articulation.

If on the other hand any of the methods mentioned under heading 2 are to be employed fasciodesis (Vulpinus), tenodesis or the formation of periosteal bone flaps may be immediately added to the procedure just mentioned. Here as a rule enlargement of the initial incision or the addition of other incisions will in most cases become necessary. Klapp and Vulpinus regularly supplement arthrodesis by tenodesis and fasciodesis. Hoffa (10) advised the addition of a pedunculated periosteal bone flap with the base on the lower posterior end of the tibia which he turned down with the result of forming a bridge to the upper surface of the calcaneus. Cramer



sulphate grain $\frac{1}{100}$ given about 15 minutes before the anæsthetic was begun. Where immediate relaxation was desired morphine grain $\frac{1}{4}$ was generally used. It has not been found necessary to use opiates in repeated doses preceding the anæsthesia in order to make possible a quiet and rapid induction.

INDUCTION

In most instances the period of induction has been from 3 to 5 minutes. This rate of induction has not necessitated pushing the gas to a degree to add to the discomfort of the patient. Ordinarily no period of excitement was observed other than slight and easily controlled movements of the arms or legs and more frequently the process resembled that of sleep. Nausea and vomiting have been seen infrequently during induction even with emergency unprepared patients who may have taken food recently. The anæsthetic was usually started with a mixture of 90 per cent ethylene and 10 per cent oxygen. Because of the danger of the possible production of a static spark the routine has been established of placing the mask on the face previous to turning on the gas. While it might be a little more pleasant to the patient to have a less abrupt introduction to the gas many prefer this method to a more gradual approach and at most the period of unpleasantness is very short.

When the patient has become thoroughly anesthetized the mixture is gradually altered usually to approximately an 85 per cent ethylene and 15 per cent oxygen ratio which mixture anaesthesia of sufficient depth can be maintained to produce excellent relaxation in most cases. Frequently it has been possible to reduce the ethylene content to as low as 75

per cent and still maintain satisfactory relaxation. In those cases in which it has been necessary to use a richer mixture throughout the operation in order to maintain a desirable relaxation no deleterious effect have been observed. The criterion in regulating the relative percentages of the gases has been the composite picture of the patient's condition as shown by the respirations, pulse rate and quality, the circulatory condition and the degrees of relaxation. When anaesthesia becomes too deep the respirations usually become rather stertorous and later slow and shallow and cyanosis develops. As has been noted by other observers the skin usually remained a good color and cyanosis was rare when just enough of the ethylene was used to maintain good anaesthesia. The moisture of the skin was seldom greater than normal and was markedly less than that ordinarily encountered with ether anaesthesia.

At times it was found advisable because of unsatisfactory relaxation to augment the ethylene-oxygen with ether. This was done in 60 of the 1421 major operations or in 11.18 per cent of the cases. The average amount of ether used was 2.19 ounces and was just sufficient to give slightly better relaxation through a particularly trying period of the operation. In a few instances it was found necessary to change entirely to ether anaesthesia. In the face of this occasional necessity it should be borne in mind that even with ether perfect relaxation is not always obtainable. The various types of operations in which ether was required will be discussed below.

PULSE

The pulse rate and quality were not appreciably affected by ethylene in the amounts ordinarily

union of the joint surfaces. This is impossible as long as there is any macroscopically perceptible amount of cartilage left covering the joint surfaces and as long as any secreting synovial membrane remains. Success is also highly improbable before puberty, as before that age there is not sufficient ossification of the tarsal bones to insure vigorous osteoplastic action. Therefore most scrupulous removal of all the hyaline cartilage and synovial membrane is the *sine qua non* of success of the operation. The age must be properly chosen. Epiphyseal lines must not be injured by the procedure. Furthermore it goes without saying that eventual contractures should be corrected before the operation by manipulation, achillectomy, division of the plantar fascia, etc. The functional aim must be usefulness of the limb without apparatus of any sort.

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The proper methods for arthrodesis may be divided into

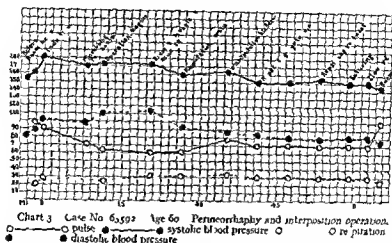
1. Methods in which the attack is on the joint surfaces only.

2. Those which add to this reinforcement (a) by fasciodesis or tenodesis or both and (b) by pedunculated periosteal bone flaps.

3. Methods employing free bone grafts (autogenous and heterogenous) or foreign material (nails, ivory pegs, etc.).

In the methods under heading 1 the approach to the operative field is similar to that used for erosion or resection of the ankle joints. Kocher's lateral incision is preferable for this purpose. Lauenstein (2), Koenig, Albanese, Ochsner (12) and others have devised modifications of this method to suit individual conditions. But Kocher's method on the whole gives very satisfactory access to the operative area. The joint is opened and by forcing the foot into strong varus position the talus is gradually exposed. After thorough removal of all cartilage and synovial membrane from the talus itself, the lower end of the tibia and fibula and the inside of the malleoli, the bones may be put into intimate apposition and the wound closed. The result is fibrous or even possible bony ankylosis of the talocrural joint. If it should be desirable to treat the adjoining joints in the same manner, the Kocher incision will in most cases give fairly good access. Steindler (15) in a recent article describes a modification of this type of operation which he has used in a considerable number of cases with good results. It consists of a fusion of all the joints of the ankle with the exception of the calcaneocuboid articulation.

If on the other hand any of the methods mentioned under heading 2 are to be employed, fasciodesis (Vulpinus), tenodesis or the formation of periosteal bone flaps may be immediately added to the procedure just mentioned. Here as a rule enlargement of the initial incision or the addition of other incisions will in most cases become necessary. Klapp and Vulpinus regularly supplement arthrodesis by tenodesis and fasciodesis. Hoffa (10) advised the addition of a pedunculated periosteal bone flap with the base on the lower posterior end of the tibia, which he turned down with the result of forming a bridge to the upper surface of the calcaneus. Cramer



tasis the bleeding has not been abnormal. These instances might well be the result of individual variations of blood pressure or tonus of blood vessels as may be noted with the use of any type of anesthesia. Horslev (5) has reported no alterations in the blood coagulation time following ethylene anesthesia.

USE IN MINOR SURGERY

In this series of 2750 cases 139 anesthetics were used in minor surgical procedure. The included 539 incisions and drainages of abscesses 39 minor equestrectomies 97 minor amputations 76 closed reductions of fractures or dislocations 76 manipulations 85 dressings 66 repairs of traumatic injuries 103 paracenteses 30 cystoscopic examinations 45 extractions of teeth and a miscellaneous group of 201 made up of radium insertions excisions of moles and small subcutaneous tumors biopsies pelvic examinations lavages of infected joints etc.

Ethylene has proven especially satisfactory for the types of operation just mentioned. The great value lies in the fact that rapid anesthetizing can be accomplished and rapid regaining of consciousness follows with little or no residual morbidity so that minor operations may be done in the out patient department and the patients be able to return home in a short time. Of this minor group 879 were male and 450 were female patients. The ages varied from 9 months to 77 years. In 919 of these cases the anesthetic was given by professional anesthetists and in 410 by junior members of the surgical staff.

A great majority of the patients represented by the group of 539 for incisions and drainages were those coming in with abscesses of the hands or

furuncles requiring immediate opening regardless of the fact that food may have recently been taken. A very light anesthesia was sufficient to permit these procedure. There was very little tendency to move an extremity which was being incised even though the narcosis was obviously superficial. The regaining of consciousness was extremely rapid and nausea and vomiting by no means always an accompaniment. When vomiting occurred the retching could usually be quickly overcome by the taking of a few breaths of fresh air.

With this entire group of minor operations it was noted that the after effect was usually a pleasant one. While the patients awoke without any period of excitement or struggle it was usually with a sense of well being at times enhanced by the residual of dreams of a rather extravagant but pleasing character. Complete regaining of consciousness occurred in 10 to 3 minutes and this time could be decreased by a few inhalations of pure oxygen. It has been observed that the use of oxygen during the period of reaction decreases the liability of nausea and vomiting.

For manipulation of joints and closed reductions of fractures or dislocations ethylene has proven valuable. Excellent relaxation may be obtained and it has the additional advantage of permitting frequent repetitions should this be desired without the objectionable features of ether. For doing extensive painful or disquieting dressings this gas has been ideal. Only slight anesthesia has been required. It has been employed daily over a considerable period of time in some cases without any discovered deleterious effects. Here too the rapid regaining of consciousness with little or no nausea has been of value. The



Fig. 6 Showing the incision to be made with the ankle joint in the position of extreme extension

substance entailed by thorough removal of cartilage from the malleolar surfaces of the ankle joint be compensated and thus wobbling or play of the talus within the so called malleolar fork be prevented? Offhand there are two ways of accomplishing this aim namely by narrowing the intramalleolar space or increasing the width of the talus. Wittek (21) Farrabeuf and Goldthwait followed the first route the former by removing a small slice of bone from the adjacent surfaces of the tibia and fibula at the spatium interosseum the two others by suggesting osteotomy of the malleoli or the fibula above the joint. Starz thought that longitudinal splitting of the talus would accomplish the same result. Vulpius (19) in his remarks on this point suggests the interposition of cartilage as the logical means of holding the two pieces of talus permanently apart.

Now to my mind cartilage is a material not well suited for this purpose. First of all from a purely mechanical standpoint it is more or less elastic and is not available in the thickness generally needed to fill the gap. Second if we consider it physiologically and leave the cartilaginous epiphyseal line as not available and not suitable for our purpose cartilage is not a material which has great regenerative and healing power. Healing generally proceeds with the formation of connective tissue and the possibility of bone formation is very small indeed. This is a very important point. Third and last it is an accepted principle in the field of technique of transplantation that autogenous and homogenous tissues are best suited for the repair of defects epidermis to epidermis muscosa to muscosa tendon to tendon and in our case if anything bone to bone.

In this connection there is still another important factor of a primarily mechanical nature

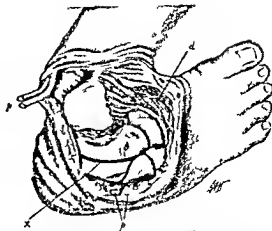


Fig. 7 Showing exposure gained by complete division of skin fascia vessels nerves muscles tendons of the peroneus longus and brevis ligament and joint capsule *yy* cut tendons of peroneus *cd* extensor digitorum brevis *x* line of division of the talus Foot in extreme inversion and adduction

For illustration of the mechanical conditions applying to the case under consideration I present five schematic sketches (Figs 1 to 5). In 1 and 3 the circle represents the talus *A* the axis of rotation and *B C* the superior contact surface of the talocalcral joint. In 1 the axis *A* is assumed to be freely movable. One can easily see that if a rotating force is applied in the direction of *O B C* will simply roll off the contact surface in the direction of **. If we assume however as in Figure 2 that the axis *A* is fixed then the rolling off cannot occur. *B C* will act as a friction surface with brake effect. Figure 3 shows the actual condition applying in our case the shaded



Fig. 8 The black lines indicate the joints denuded of cartilage and synovial membrane. The dotted line *x* indicates the plane in which the talus is to be divided. The shaded area *x* shows the bone disk removed for implantation into *x*. At *o* the joint surfaces are removed a little more thoroughly.

TABLE II

Type of operation	Number of patients	Number anaesthetized with ethylene	Percentage with vomiting	Number with ether	Percentage with ether	Average duration in minutes	Average number of minutes omitted	Average duration with anaesthesia and vomiting
General	68	6	8.8	40	59	6	3.2	8
Thyroid	42		52.4			40	2	0
Appendix	0	3	50	3	0	4	5	5
Pylorus	95	43	45	1		5	3	1.2
Orthopedic	6	47	4.5	0	8	6.5	1	2.4
Stomach	37		2		34	0	5.2	17.6
Intestine	10	5	50	4		4.5	1.6	6
Local	3	32	6	1	8	6.1	0	12.5
Neurasthenia	4	0	2.5	6	14	6.5		

anæsthetists and in 131 by junior members of the surgical staff

Of the 41 thyroid operations which were done on 333 patients 55 were polar ligations 31 were single lobectomies 29.4 were double lobectomies and 32 were secondary closures. In none of these was ether used as an adjunct anaesthesia and only in the early cases anaesthetized with ethylene was 1.2 per cent novocain used locally in conjunction with the gas. This latter practice was abandoned in a comparatively short time. Of the 333 patients having thyroid operations there were 132 with hyperplasia of the gland with varying grades of hyperthyroidism 98 with single or multiple adenoma without hyperthyroidism 52 with adenomata and 18 with simple colloid goiters. The ages of these patients varied from 16 to 70 years. Of the 184 patients with toxic symptoms the basal metabolic rate varied from plus 10 to plus 92 per cent an average being about plus 45 per cent pre operative following a variable period of rest and treatment in the hospital. A great many of these patients had definite cardiac damage as shown by clinical and electrocardiographic surveys some of them with auricular fibrillation.

The advantages of ethylene in goiter operations especially in those with a high metabolic rate are first the ability to secure a rapid quiet induction without a period of excitement or labored choking respirations second the ability to use it over a long period of time without any apparent stimulative or depressive effect from the gas itself third a rapid regaining of consciousness with a great deal less postanæsthetic nausea and vomiting than previously encountered with the use of ether and fourth the avoidance of the excitement and other mental disturbances which frequently occur with the use of local anaesthesia especially with nervous high strung patients Pa-

tients with a considerable degree of myocardium stood this anaesthesia well. It has not been felt that hæmorrhage has been any more difficult to obtain than when ether was used.

Of the 3,9 abdominal operations 100 were appendectomies 94 cholecystectomies with 54 of which appendectomy also was done 109 hernioplasties 32 gastro-enterostomies 16 abdominal explorations 14 colostomies 5 intestinal resections 4 cystico-choleo-duodenostomies 3 excisions of gastric ulcers and pyloroplasties. The advantages of a quick easy induction and a rapid regaining of consciousness were evident here as in other instances. Probably the greatest recommendation for ethylene in this group lies in the fact that necessary surgical procedures may be carried out without the anaesthesia itself acting as an aggravating influence on such coexisting pathological conditions as chronic myocarditis arterial hypertension chronic nephritis and chronic bronchitis. With the latter condition of course any gas probably has some irritating effect, but without question it is immeasurably less with ethylene than with ether. In the great majority of this group entirely satisfactory relaxation was obtainable. In 28.4 per cent of the entire group ether was required to decrease the muscular tension during particularly trying stages of the operations. The average amount of ether used with the 109 patients requiring it was 2.13 ounces. As will be readily seen this amount is negligible as compared with the total amount ordinarily required for major abdominal surgery. Of these 109 patients 18 had hernioplasties 49 had gall bladder operations 20 had operations on the stomach 13 had appendectomies and 4 had intestinal operations. It will be noted that the gall bladder and stomach operations add greatly to this group 50 per cent of the former requiring



Fig 15. Roentgenogram made 25 months after operation fibulotibial and tibiofibular views

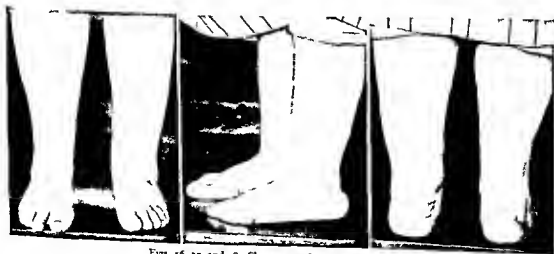
median line. It is well to carry the separation of these tendons well above and below the line of the skin incision.

The next step is the dissection of the extensor hallucis brevis and the extensor digitorum brevis off the calcaneus in the neighborhood of the sinus tarsi. This dissection is also carried well toward the toes. Here it is necessary to be mindful of the arteria tibialis anterior and its branch the arteria arcuata which are not to be divided if it is possible to avoid them.

These preliminary steps expose (Fig 7) the articulation talocalcralis talocalcaneae talonavicularis calcaneocuboidea and cuneonavicularis. These joints are attacked in the sequence mentioned. Under increasing hyperextension and hyperinversion of the area beginning with the tarsomalleolar ligaments the joints are opened. All cartilage and synovial membrane are removed from the joint surfaces and recesses with chisel, rongeur, curette and scissors as painstakingly as possible. The spongiosa of all the surfaces should

be plainly evident wherever bony union is desired. The inner surface of the malleoli and the corresponding aspects of the talus deserve special attention in this respect. After this step of the operation has been completed the talus holds its connection with the rest of the tarsus only by means of the structures inserting on its medial posterior and posterolateral surfaces and the navicular by its attachments on the caudal aspect. These attachments are by no means to be disturbed.

The previous step has decreased the medio-lateral diameter of the talus to such a degree that intimate apposition within the malleolar fork has become illusory. In order to re-establish this relationship the bone is split with a chisel in the midsagittal plane (Fig 8) into two distinct halves with a gap between each half being attached to the neighboring bones by the structures mentioned above. Now the width of the cleft is estimated and a disk of bone is cut from the anterior pole of the caput tali. This disk is of



Figs 16, 17 and 18. Showing result on weight bearing

a result of irritation and altered functions of the respiratory and gastro-intestinal systems

Of the postoperative pulmonary complications there were found 1 case of lobar pneumonia which made a good recovery; 4 cases of bronchopneumonia 2 of which made good recoveries and 2 of which died and 1 case of bronchitis which made a good recovery

The patient who developed lobar pneumonia involving the right base was a male aged 28 who had had an excision of a left renal calculus. On the afternoon of the day of the operation his temperature rose to 100 degrees and on the first postoperative day reached 106 degrees. Examination revealed a consolidation of the left base. He made a good recovery and on the twelfth day postoperative his lungs were clear and his temperature was normal. Here evidently was a patient with a fairly virulent organism present in his upper respiratory tract before operation. The slight irritation of lung tissue combined with the shock of operation was enough to allow the bacteria to do sufficient damage to lead to consolidation.

Of the 4 patients developing postoperative bronchopneumonia 2 recovered and 2 died. Of the 2 who died 1 was a man of 54 with marked hyperthyroidism and resultant myocarditis who was operated upon because of a general peritonitis which resulted from a perforation of a duodenal ulcer. He died on the third day postoperative. The pathology in the lungs was not marked clinically but autopsy revealed the presence of a lobular pneumonia of both bases. The general peritonitis and myocarditis certainly contributed largely to the patient's death.

The second fatality of this group was a male of 66 who was operated upon because of a strangulated hernia. The operation was somewhat prolonged while the effect of heat on the cyanotic intestine could be determined. In this anaesthesia about 3 ounces of ether also were used. The patient rapidly developed signs of pulmonary inflammation following operation and died in 53 hours. Postmortem examination showed the portion of the intestine which had been strangulated to be in good condition. Examination of the chest revealed the presence of a bilateral lobular pneumonia and bilateral acute exudative pleurisy. One might consider the possibility of emboli from a mesenteric vessel involved causing multiple foci in the lungs but the course was so acute that it seems more likely that the bacteria were there and that the result to the parenchyma was sufficient to allow a rapid production of multiple areas of consolidation. The ether used produced

a complication which made an exact evaluation of the effect of the ethylene more difficult.

Of the 2 patients who recovered 1 was a female aged 30 who had an excision of an immense tumor of the left abdominal wall. Because of the loss of tissue the closure was extremely difficult the operation requiring 2½ hours. The abdomen was snugly strapped to reduce the strain on the sutures. On the day following operation the temperature rose to 103 degrees with a corresponding elevation of pulse rate and a respiratory rate of 40. Examination of her chest revealed the signs of a bronchopneumonia of the right base posteriorly. The course was uneventful and temperature, pulse rate and respiratory rate were normal on the eighth day and remained so. Recovery was complete. The length of the operation combined with the limiting of the respiratory excursion by the necessary strapping probably contributed to the complication.

The other of these two patients was a woman of 26 who had had a cholecystectomy and appendectomy. Operation lasted 53 minutes. On the afternoon of the day of operation her temperature rose to 102 degrees and signs of some consolidation in the right base posteriorly were evident. The pulse rate was proportionately elevated. Both temperature and pulse rate gradually fell to reach normal on the seventh day postoperative. Temperature remained normal and convalescence was otherwise uneventful.

The patient who developed bronchitis was a man of 69 who had had a suprapubic prostatectomy. The area involved was the left base. The temperature rose to 102 and rales were numerous. They cleared up rapidly however and by the third day postoperative the chest was clear and the temperature normal and the patient made a good recovery.

There were in this series I am sure other patients who for a variable time had various types of rales in the lungs. The recovery of these was all good, however and the clinical data were not sufficient to warrant so specific a diagnosis as bronchitis.

In regarding the contributory influence of the myocarditis and peritonitis in one case and the use of some ether in another the postanaesthetic pulmonary morbidity of the major groups was found to be 0.42 per cent. No pulmonary complications followed the use of ethylene in the minor groups.

The most important complication referable to the gastro-intestinal tract is the nausea and vomiting. It occurs in variable degrees of course with all types of anesthetics. In this series of



Figs 22, 23 and 24 Showing result on weight bearing

foot. Only the extensor hallucis brevis showed a trace of activity. The result was complete pes equinovarus and flail ankle. The motion in the knee and hip was good. There was a fair amount of contracture of the gastrocnemius and soleus. The patient's chief complaint was inability to walk comfortably and frequent tripping which was especially dangerous as she was rather corpulent. Stabilization of the ankle joint was advised.

The operation described was done on January 8, 1924 with arthrodesis of the following joints: talocalcaneal, talonavicular, talocalcaneal, cuneonavicular and calcaneocuboid. A bone graft was placed in the plantar and achillectomy done. A plaster cast was applied in a position slightly larger than right angle. February 16, 1924 the plaster cast was removed and on March 8 a light plaster cast was applied and the patient allowed to walk on crutches. On April 2 a roentgenogram was made and the cast changed. May 5 the cast was removed and walking with canes allowed. September 10 the appearance and function were good. September 25, 1925 function was excellent the patient walking without the slightest discomfort. January 21, 1926 the X-ray showed perfect consolidation and on March 1, 1926 good results (Figs 9 to 18 inclusive).

CASE 2. J. H. M. female married at the time of her first pregnancy in 1914 had poliomyelitis anterior with the immediate result of partial paralysis involving the entire right side from the neck down. This gradually receded and left her with only about 10 per cent function of the tibialis anterior, 30 per cent function of the extensors and flexors of the thigh, the adductors of the thigh being fairly normal and the gluteus maximus and medius entirely paralyzed. The entire leg musculature with the exception of the tibialis already mentioned was paralyzed. The extensor hallucis brevis showed a slight trace of activity. The patient complained chiefly of considerable interference with her ability to walk and constant stumbling and falling. Immediate stabilization of the ankle was advised and a later sacrospinal plastic operation according to the method of Lange.

On October 15, 1925 the author's operation was done consisting of arthrodesis of the talocalcaneal, talonavicular, cuneonavicular and calcaneocuboid joints. A bone disk from the head of the talus was implanted into the plantar talus.

On November 28, 1925 the cast was changed again and on December 15 it was changed and the patient allowed to

walk with crutches. February 3, 1926 the cast was discarded and the patient encouraged to walk with canes only. March 16 the patient was walking without any support. April 27 the result was excellent. August 26 the patient was making such good progress in walking that she thought of having the second operation postponed indefinitely (Figs 19 to 23).

In conclusion I wish to say that a properly executed arthrodesis of the ankle joint is a very satisfactory operation from every point of view. I agree fully with Vulpinus (17) when he says that in case of failure the operative technique is to be blamed and that it must be our endeavor to find modifications of procedure which exclude such failure. I am convinced from my experience that the principle of intimate apposition of the talus and the malleolar fork is sound from a mechanical, anatomical and physiological standpoint and that if the principle is applied to any operative procedure aiming at the production of ankylosis of the ankle joint it will give greater stability and better fusion than any other method.

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Fig. 1. Prone position. The diaphragm line on the left cannot be made out. In the lower part of the left lung area there is an area of decreased density. Above this is a clear space occupied by the gas-filled stomach in which lung markings are absent. The stomach wall may be seen at the level of the fourth rib in front and the seventh and eighth ribs behind. The heart is displaced to the right.



Fig. 2. Prone position. This film was made after the ingestion of the barium meal. Observe the barium in the dependent portion of the stomach. There is a large amount of gas in the herniated portion of the stomach lying above the barium.

substernal pain, pain radiating to the back or left shoulder, gastric symptoms at night and at times difficulty in swallowing with regurgitation. Many of these patients are not able to lie on their backs after a meal. A number of cases have been reported in which operation has been done for supposed gastric ulcer without an ulcer being present. Simulation of gall bladder symptoms is not unusual. With a history of previous injury, especially if there are wounds near the diaphragm, hernia should be suspected. However, in the majority of cases we must look to the radiologist for assistance.

PROGNOSIS

Hedblom (9) in September 26, 1915, reported all recorded cases which had been operated upon. 10 were from the Mayo Clinic with 15 recoveries. 359 were from the literature—a total number of 3,68 cases with 251 or 66.4 per cent recoveries. Strangulation occurred in 33½ per cent of this number. 126 cases showed acute obstruction resulting in a mortality of 53.1 per cent. 252 cases showed no obstruction with 59

deaths or a mortality of 23.4 per cent. The operative mortality from cases operated upon by the abdominal route was 42.9 per cent, the transpleural route 19.8 per cent, the combined route 26 per cent. Two thirds of the cases were traumatic in origin and 90 per cent showed no sac.

The mortality is high but with improved methods and early diagnosis a more favorable outlook may be anticipated.

TREATMENT

As in other types of hernia surgery undoubtedly offers the only means of cure. In all cases of strangulation or incarceration, operation should be done at once. In other cases operation should be performed if symptoms are serious enough to cause disability.

The transpleural route offers more favorable results if the diagnosis is positive and the operative intervention is not done as an exploratory measure.

been under the care of an oculist in Oakland who stated that he had subsequently operated upon the pterygium (transplantation) three times only to have it recur persistently. The left eye showed nasally a pterygium composed of a raised nodular mass encroaching upon the cornea for about 2 millimeters. There was definite contraction of the conjunctiva below and nasally was a symblepharon. Because of the size and the lobulated appearance malignancy was considered a possibility. The small piece of tissue removed for examination was reported by Dr. Fusk of the Department of Pathology to show granulation tissue with no evidence of malignancy.

Radium was applied October 29, 1925, a 53 millicurie capillary tube screened only by a strip of adhesive being held directly to the pterygium for 4 minutes. Two weeks later the patient had a well defined radium reaction that subsided gradually and coincident with this the granulation tissue disappeared. At the time of the last examination, September 24, 1926, there was present only a retrogressive flat pterygium, the blood vessels being markedly contracted. In this particular case only one application of radium was deemed necessary.

CORNEAL MALIGNANCY

CASE 5. Mrs. E. L. S., age 68, was seen May 7, 1925, and gave the history of observing a white spot on the right eye for the past few months that seemed to have grown slowly. It caused no symptoms. Examination showed to the cornea of the right eye an opaque roughly circular mass extending from the limbus to near the upper pupillary margin. The periphery appeared grayish white, flat and inactive, while the center was darker in color, finely lobulated, located in the adventitia and apparently extending to Descemet's membrane. From the limbus were both superficial and deep blood vessels extending into the growth. Diagnosis: Corneal malignancy.

On May 11, 1925, the eye was cocainized and 143.6 millicuries (emanations) in a small capillary tube screened with 3 millimeter silver and .5 aluminum was applied to the cornea over the mass for a period of 5 minutes. May 27, the mass seemed a little smaller. June 4, 10.5 204 millicuries were applied for 3 minutes, the same screening being used. June 25, the emanations not being available, a 10 milligram plaque (same as in Case 1) screened with 1 millimeter aluminum and rubber dam was applied for 5 minutes. This was repeated July 22. The tumor mass was now half its original size and the blood vessels distinctly smaller. The dosage given June 25 was repeated August 12 and again September 2. October 6, 35 millicuries screened only by a piece of adhesive were applied directly to the

cornea for 8 minutes. This application was followed by a mild local reaction. The corneal process gradually subsided so that by January 6, 1926, only a flat scar remained to which there were several small areas that gave the appearance of calcification. The blood vessels were now barely visible. Subsequent observation has shown no change in the condition.

COMMENTS

The cases here reported are all of the type that were resistant to the usual therapy, the type that frequently is a source of chagrin to the oculist when after extensive treatment the condition remains unaltered. It is in this variety particularly that the possibility of radium therapy should be kept in mind.

In the conjunctival cases the desired result was obtained with much milder doses than is at a greater distance and with more screening than those used in the vernal conjunctivitis, the pterygium or the corneal malignancy. Another factor to be observed is that the dosage which with very little screening was applied directly to the everted lids did not produce a reaction in vernal catarrh but in the pterygium with its granulation tissue amount produced a reaction. In the corneal malignancy the application of radium made unnecessary the enucleation of an eye that had 8 of normal vision before and after treatment. In this particular instance it seemed the only available therapy.

An interesting observation has been called to our attention numerous times during the application of radium, particularly during the work on incipient cataracts in which a large series of cases was under treatment. Patients frequently commented upon the fact that indefinite neuralgia like pains that had been present about the eyes and temples disappeared after a few applications of radium. We merely present this observation without attempting its explanation.

A NEW METHOD OF OBTAINING COSTAL CARTILAGE FOR PLASTIC AND RECONSTRUCTION SURGERY

By JOSEPH D KELLY M.D. F.A.C.S. NEW YORK

MUCH has been written upon the subject and many instruments have been introduced for plastic operations during the past few years. Hence one hesitates about introducing something new or presumably new into the armamentarium of the plastic surgeon unless it has a place and I did not offer these instruments for consideration until they had been used by other surgeons and had met with their approval.

The difficulties which I experienced in doing nasal plastic surgery by the old method had been the resecting of a piece of rib or the removal of a piece of costal cartilage. The time and energy consumed in resecting a rib and the danger of perforating the pleura seemed to me rather out of proportion in view of the fact that after its removal the bone had to be shaped to the size required. Also the removal of a piece of costal cartilage consumed an equally unreasonable amount of time and patience with a large element of uncertainty as to whether the piece removed was going to fulfill the requirements of the case at hand.

Some few years ago after becoming thoroughly converted to the use of costal cartilage I started

the search for a simpler and better method of removing cartilage. My idea was a chisel but the surgical instrument houses had no such chisel and could not understand the type of instrument I wanted. The answer came while I was watching some wood carvers work at an exhibition in New York. The chisels used by them seemed to be just the thing I was looking for. They were sharp, the proper size, well balanced, easily handled and could be sterilized.

I purchased some of these chisels and experimented with them on cadavers. The result was good. I found that they could be forced over the surface of the pleura without injuring it and that the pleura was punctured only when a deliberate attempt was made to do so by forcing the chisel backward or downward at right angles to the chest wall. They would also deliver a piece of cartilage of a size, shape and thickness corresponding to the size of the chisel used.

This gave me encouragement but not having an unlimited supply of cadavers I had to find a substitute to practice upon. The large yellow turnip



Fig. 1 Showing the method of measuring the length of the transplant.



Fig. 2 Showing application of a piece of turnip to plaster model to determine its fitness for the case.



Fig. 3 Showing the insertion and placement of cartilage transplanted in simple saddle back nose.

not sufficiently fix the bone and dislocation may occur

Deutschlaend's modification of Heine's operation was to add an aluminum splint and screws to hold bone ends in apposition

More recently Calvé Duçing Uteau and Tunstall Taylor have suggested new procedures for compensatory shortening of the unaffected femur

Calvé describes three ingenious procedures (1) auto-pegging (2) that by tenon and mortise (3) by direct holding (dovetailing)

The method of auto-pegging is the easiest to perform and is recommended because of its simplicity. The second procedure that by tenon and mortise gives better end-to-end apposition and a good alignment but is a more delicate operation. The third method suggested is dovetailing or direct holding. This method is mechanically perfect and prevents anteroposterior as well as lateral displacement. Calvé states that this is difficult of execution and that the method had better not be employed. His first procedure auto-pegging which seems very practical consists of an oblique section of the femur in the middle third. From the upper part of the lower fragment a quadrangular tenon is cut out with an electric saw. The tenon is inserted into the medullary canal of the upper fragment. The oblique surfaces tend to slip one on the other the tenon is wedged up and limits the ascent of the lower fragment. Angular displacement of the lower fragment is impossible. The shortening is equal to the length of the tenon plus the thickness of the compact bone—the cortex to the medullary canal. In this procedure the line of force is preserved and the functional result excellent.

The methods advised by Calvé show a distinct advance in bone surgery and stand for mathematical certainty and exactness in length.

The procedures mentioned above for lengthening as well as shortening the limbs have been entirely with operations upon the femur. From its length and the character of the muscles attached this bone lends itself more readily to either operation.

In a fairly complete survey of the surgical literature of the past 50 years I have been unable to find the report of a case in which the tibia and fibula have been shortened to correct the disproportion in leg length. The first case to be discussed in this article is that of a professional skater a young man age 28 who has given exhibitions of his skill in most of the large cities of the United States and Canada.

In December 1919 while performing his a t h e l l and fractured both bones of his right leg. He was treated in a local hospital for some weeks and the end result was a firm union of the bones of the leg but consolidation had taken place with a full inch or more of shortening. He walked with a slight limp but got around very well. On attempting his fancy skating he found he was handicapped. He was unable to perform certain glides the spread eagle and many of his intricate figures that required his knees to be on an even plane. Realizing that his skill was no longer greatly hampered he sought advice in regard to operative lengthening of his shortened leg. Different surgeons consulted, felt that no definite promise could be given as to the length gained by operation. The idea was then abandoned but the suggestion that the opposite leg be shortened to bring the knees on the same level forcibly appealed to the patient and the following operative procedure was followed out in January 1921.

The usual incision of 6 or 7 inches as for a tibial graft, was made over the middle third of the normal tibia with the aid of a small metal ruler an area 5 inches long and 1/2 inch wide was outlined on the flat surface of the tibia. This piece of bone was removed by a motor saw by means of a single blade and the cut was made somewhat at an angle (Fig. 1) the cortex being broader than the medullary portion (Fig. 2 a and b). The object was to prevent the tongue of bone from dropping into the medullary canal when it was later placed in the slot at the tibial end. After the shortening had been done. About the middle of the tibia a cylinder of bone the required length to be shortened was removed by using the gigli saw posteriorly and the motor saw for the anterior portion (Fig. 3 a b). Through an incision over the external border of the leg the fibula was exposed at about the same level as for the tibia and a similar piece to that taken from the tibia was removed from the fibula (Fig. 4 a). The fibula was cut obliquely the ends quickly came to either end and were held in end-to-end apposition by kangaroo tendon through drill holes (Fig. 5). The cut ends of the tibia were held together by fitting the wedge of bone into the bed from which it was taken and holding it there by kangaroo tendon through drill holes in the side of the slot and over the incisions usually done in the bone graft procedure as suggested by Albee (Fig. 6). It was of course necessary to shorten the tibia and of bone (Fig. 7 b) so that it would not rely fit as a key in the slot. This held the ends of the tibia in perfect apposition and alignment. Their same relative positions were maintained without any chance for rotation of the lower fragment. An additional reason for using the graft was its osteo-genetic power as it gives earlier bone production and consolidation.

At last as by first intention without plaster of Paris as carried out for 8 weeks. For a weeks more some weight bearing was permitted with plaster up to 1 for the months following a double upright brace comes into being the knee was used to prevent any possible bowing at the point of union. Callus formation was slow. The roentgenogram showed only slight callus formation at 8 weeks. Consolidation was complete in 4 months.

In about 6 months this patient had resumed his old profession exhibition skating and in a year was doing his most difficult stunts with his old time skill and during performance his intricate figures showed no better than before his injury. He has since given exhibitions of his skill in most of the large cities of the United States and Canada.

We realize that in this case the shortening of the leg was only a small amount 1 inch. Considering this were we justified in subjecting the

very seldom necessary to use more than two chisels in an operation only two handles were made. After having used these chisels for some time I noticed that the cutting edge became quite serrated and on inquiry at my instrument makers I found that this could be overcome by having the chisels made of a better grade of surgical instrument steel. I believe this difficulty has been overcome in the instrument produced by Tieman and Company.

The method which I have developed for the use of these chisels is as follows:

A plaster cast is made of the patient's face by the use of quick setting dental plaster. If the case is a simple saddle back nose it does not take long to determine what steps to follow at the time of the operation. The cast Joseph's rule chisels and yellow turnip usually solve the problem to the satisfaction of yourself and the patient. The first step is to measure the distance from the frontal bone to the tip of the nose. Decide whether you want the transplant to be 4 $\frac{1}{2}$ or 5 centimeters. Then measure this distance on the cut surface of the turnip at both ends of the diameter and connect these points with lines made with some sharp instrument. You then select the chisel or chisels which you believe will be suitable for the case and cut several pieces of turnip and apply to the cast and note the result. It may be necessary to bevel one end to fit the frontal bone or taper it more at the tip. After you have decided upon the sort of piece you want it is well to practice cutting that particular shape as accurately and as quickly as possible. This is your model of the piece of cartilage you want to deliver at the time of operation. You know that if you can deliver a piece of cartilage of that size and proportion your operation is going to be a success. I have made it a practice to preserve this model by covering it with paraffin, taking it along with me to the operating room for reference and comparison.

If the nasal bones are prominent at any point or if the septal cartilage is poor it is well to groove the cartilage before cutting it in order to make it conform better to nasal bones and prevent sliding.

If the case is other than a simple saddle nose that is one in which it will be necessary to remove a hump or cartilage twist or remove some of the ascending process of the superior maxillæ a little different method is followed. In a case of this sort we make a second mold that is a partial plaster mold of the nose, eyes and mouth of the original plaster cast. By using plastine to fill this mold we can make as many impressions of the nose as are necessary for the study of the case.

Markings are made on the plastine model to correspond to the position and size of the nasal bones and the ascending process of the superior maxillæ. Then with an ordinary spatula or clay modeling tool the plastine is removed from the model at the points of election. This gives you some idea of how the nose will look when these bones are removed. The next step is to cut from the turnip a model of the cartilage transplant to be made place this in position on your plastine model and you have something definite by which to judge what the result of your operation will be.

SUMMARY

I believe that I may safely say that by this method we eliminate the disadvantages of the old way of removing cartilage because with the use of these chisels the cartilage may be removed much more easily, more rapidly with less danger and more accurately. This method makes it possible for a greater number of surgeons to do the simpler cases of nasal plastic surgery with more confidence in themselves and with more satisfaction to their patients.

This work has been developed through the courtesy of and on the clinic of Dr. Hiram Smith at Manhattan Eye and Ear Hospital, New York City.

and is used as a guard to protect the soft structures. A rotary bone saw with a large blade is used to cut through the femur transversely. This is done about the middle of the shaft (Fig 4).

In a femur of large caliber it is usually necessary to use a gigli saw to complete the section at its posterior and inner part. The proximal and distal portions may then in turn be readily brought through the incision and cut longitudinally by the motor saw the required distance to be shortened, the saw making the cut in an antero-posterior plane. One half the shaft is removed from the proximal fragment (Fig 5b) the other half from the distal fragment (Fig 5a). The cut ends are fitted together (Fig 6) and held in position by a bone clamp while two holes are drilled in each fragment and then threaded with a tap for beef bone screws which maintain the cut ends in firm apposition (Fig 7).

It is necessary to have the bone screws of sufficient length to go through the cortex from side to side. In our first case the screws were too short and pulled away from the cortex on the inner side necessitating the use of the Parham

band to maintain apposition. Union in these cases takes place in about the same time as it does in the average fracture case with open reduction. There are no technical difficulties with this method and the amount of shortening can be exactly determined.

We cannot quite agree with Steindler in his recent excellent work *Operative Orthopedics* (pages 174 and 176) in which he states. For practical purposes a simple osteotomy with subsequent gliding of the fragments toward each other is a simpler, shorter and equally effective procedure provided that immobilization during and following operation is carried out correctly. We find that the overriding is hard to control at a definite point and that much of the exactness of the shortening procedure is lost if we do not measure carefully and use some method of fixation directly to the bone.

The surgical risk in these operative procedures outlined is not great. In many cases especially in young individuals it is very desirable to restore a common level to both sides of the pelvis and eliminate the use of an elevated shoe.

their general acceptance. We believe with Mc Hesson (11) that sufficient precaution has been taken when certain rules are observed in beginning and terminating the administration of the ethylene oxygen mixtures. He strongly advises applying the mask to the face of the patient with tube and mask entirely free of the ethylene oxygen mixture before the ethylene is turned on for the induction thereby causing a harmless preliminary discharge should a difference in potential exist. The constant contact of the anesthetist mask and patient thereafter maintains an equality of potential and eliminates this area as a source of production of a static spark. In terminating the anæsthetic precaution should be taken to turn off the tanks and release the pressure on the supply bags before the mask is removed thereby stopping the constant flow of the ethylene-oxygen mixture from the tube.

During the time covered by this report two explosions have occurred neither of which took place during anæsthesia and neither doing any harm except minor damage to the machines. On the first occasion the explosion occurred with a loud report and with a shattering of the glass covering of the mixing chamber. Two holes large enough to allow the insertion of a finger were torn in the rubber tubing. Later investigation revealed that the ethylene and oxygen had not been entirely turned off. The explosion occurred as the anesthetist was moving the machine through the door of the anæsthetic room into the corridor and after the machine had been moved about 8 feet. It had been standing idle about one hour at the time the explosion occurred. The most satisfactory explanation of this accident is that a static spark must have resulted as the anesthetist grasped the handle of the door or as she again grasped the machine or that a spark was produced as some part of the machine struck the side of the doorway in passing through. No personal injury resulted other than a few pin point cuts on the hands and face of the anesthetist made by flying glass. No free flame or smoke was noticed and no evidence of such remained about the machine. The neglected precaution necessary to the prevention of this accident was the turning off of the gas mixture at the completion of the preceding anæsthesia.

The second explosion occurred more recently and as with the earlier one no harm was done other than the breaking of the glass in the mixing chamber and the production of three holes in the rubber tubing (Fig. 1). In this instance an anesthetist had just been completed and the mask and tubing had been laid back over the framework of



Fig. 1. Hole in rubber tubing after explosion

the machine. The ethylene had previously been turned off. The explosion occurred as the anesthetist reached to release the pressure from the supply bag. At this time the oxygen was still turned on, having been used to hasten the patient's return to consciousness. This occurrence might be explained by assuming that the pressure bag still contained sufficient ethylene to form a highly explosive mixture with the oxygen and that the pressure remaining in the bag was sufficient to maintain a constant though diminishing flow from the mask. A spark probably occurred as the anesthetist's hand came in contact with the thumb screw of the supply bag and ignition of the gas-oxygen mixture followed. A loud report resulted and momentarily there was a bluish flame at the mixing chamber which quickly flickered out without doing any damage. No evidence of smoke or flame remained on the mixing chamber mask or tubing. In this case turning off of all pressure both from the tanks and from the pressure bag before the mask was removed would probably have prevented the explosion. No personal injury resulted from this accident.

ODOR

Objections to the use of ethylene because of its offensive odor are frequently voiced. This feature ceases to be annoying after a very short contact with the gas. Whether the olfactory mechanism develops a special tolerance to this particular odor can only be surmised but it is true that those to whom the odor was most offensive rapidly came to disregard it altogether. So far as the patient is concerned of course his first contact may be his only one. It has been brought out however by questioning many patients some of them members of the medical and nursing staff that after the first few breaths no odor whatever was noticed. No unpleasant postanæsthetic memories of the odor have been reported. This does not seem to be legitimate objection to the use of ethylene.

MEDICATION

The pre operative medication has usually consisted of morphine sulphate grain $\frac{1}{6}$ and atropine

hound has an extraordinarily well developed sense of smell. He follows the scent until he determines the probable site of the quarry, and depends on inefficient sight only for its final location. The relative unimportance of the sense of smell to man can be readily noted by the size of the olfactory ganglion as compared with the total volume of the brain. Small as the olfactory ganglion in man is however the sense of smell is an extraordinarily delicate means of direct communication with consciousness and enables many gases and vapors to be recognized by their odors in such minute dilution as to be wholly unrecognizable by any form of scientific apparatus. When the sense of smell is trained it gives immediate information of many conditions recognition of which by the other special senses would be slow and often inaccurate.

The surgeon in passing through his wards if he has given thought to training the sense of smell can recognize readily many abnormal conditions by this means. The characteristic odor of a fistula in the cæcum for instance is easily distinguished from that of a fistula in the sigmoid, rectum ileum or jejunum. In the days when typhoid fever was common a good clinician would make a presumptive diagnosis of typhoid fever from the sense of smell. Diphtheria in the old days was recognized by the odor and many conditions of the stomach can be determined by the odor of the eructated gases. Certain poisons have characteristic odors which make possible speedy identification and use of the proper antidotes. In the ancient civilization perfumes, oils and incense of pleasing odors were sent to the guest as the greatest mark of courtesy that could be shown. Many fragrant or pungent herbs were supposed to have an influence on health. The basis for this belief lies in the fact that sunlight causes various plants to excrete ozone. Most qualities that are spoken of as flavors

are recognized through the sense of smell, without the sense of smell the sense of taste could not distinguish an onion from an apple.

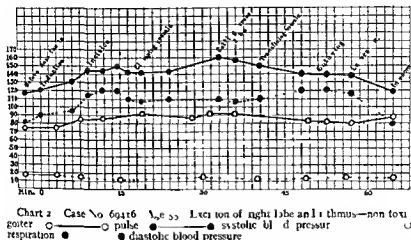
W. J. MAYO

IMPORTANCE OF EARLY ASSUMPTION OF FUNCTION IN RECONSTRUCTIVE SURGERY

INTEREST in reconstructive surgery has increased during recent years and surgeons are more and more thinking in terms of function. As a result, many of the ideas which formerly prevailed have been abandoned. This statement applies particularly to the suturing of tendons and nerves. If the statistics of tendon sutures compiled recently as twenty years ago are examined one will be convinced that the results are not as good as they should have been.

Some of the imperfect results were due to too long immobilization. Adhesions formed which could not be overcome. A tendon suture must permit of early function and must not strangulate the tendon. The Frach suture which begins well back of the line of division and merely grasps the tendon at three points on each side gives sufficient purchase on the tendon to allow of early motion. It does not strangulate. The cut surfaces of the tendon may be accurately approximated by interrupted catgut sutures. When such a suture is applied the tendon may be used as soon as the patient desires. Motion is usually prevented for about 48 hours because of pain which results from attempts at motion.

When the tendon is surrounded by a synovial sheath the possibility of late separation at the suture line should be borne in mind. Tendon does not repair entirely from tendon cells—the epitendon and peritendon take an important part in repair and when the



required for anesthesia. The ethylene itself is evidently not a cardiac stimulant and with the use of ordinary amounts alterations in the pulse are those which are more easily explained as being due to other influences such as emotional stimulation during induction, stimulation from the initial incision, pulling on the peritoneum or palpation of the viscera (Charts 1, 2, 3 and Table I). With persistent cyanosis the pulse does become more rapid in an effort to overcome the decreased oxygenation. Myocardial failure would undoubtedly follow were the anoxemia not relieved.

BLOOD PRESSURE

In attempting to evaluate the various effects of any anesthetic medium the many factors concerned must be borne in mind. Chiefly it must be remembered that operative preparations and procedures in themselves may cause great changes in the pulse, respiratory rate and excursion and blood pressure. To these may be added the effects of fluid loss and of fear and posture as noted by Clark (4). He has reported that ether and chloroform act in a fairly uniform way under uniform conditions, the former causing a fairly marked cardiac stimulation with resultant rise in blood pressure and later a depressor effect and corresponding fall, the latter being very gradual in onset and effect. Chloroform has only a slight stimulating effect and a tendency to produce a more rapid and profound depression with accompanying fall of blood pressure. An attempt to determine the effect of ethylene-oxygen on the blood pressure has been made. Readings were taken before the induction of anesthesia and at repeated intervals during the operations (Charts 1, 2, 3 and Table I).

The chemical combination of ethylene with any of the body tissues especially the blood is extremely unstable as is shown by the rapid escape in an unchanged form in the expired air with a corresponding rapidity of regaining of consciousness. Because of this instability it would not be expected that the effect on the nervous centers would be very marked. Our readings have been made on patients having widely different types of operations and in none of these were there changes in the blood pressure which we did not feel were more likely due to influences other than that of the ethylene. In most cases there was found to be a fairly marked initial rise of from 10 to 40 millimeters at the beginning of the induction. The fact that the rise occurred before sufficient time had elapsed to allow the absorption of more than the smallest amount of ethylene would eliminate it as the cause. It was undoubtedly due to the fear or excitement of the approaching procedure. The later changes were most easily explained as due to operative manipulations such as incising the skin, pulling on peritoneum, delivering a lobe of the thyroid gland, curetting bone, etc. As will be noted in the charts also the blood pressure fairly rapidly returned to approximately the pre-operative readings once the manipulative or stimulative steps of the operations were finished.

BLEEDING

In the early cases it was believed that there was perhaps some slight tendency to increased bleeding. Subsequent and continued observations have not substantiated this feeling, however. Except for the occasional patient who does seem to require more than the ordinary amount of hæmos-

MASTER SURGEONS OF AMERICA

WILLIAM WORRELL MAYO

A Pioneer Surgeon of the Northwest

WILLIAM WORRELL MAYO was born May 31, 1819, in Manchester, England. He came from a family with 200 years of scholarly traditions. Many of the Mayos had been physicians. John Mayo (1643-1679) was one of the first of the physician chemists whose combined studies led to the discovery of oxygen. John Mayo (1761-1818) was a Fellow of the Royal College of Physicians of England. Harveian lecturer in that college in 1795 and physician of Middlesex Hospital from 1788 to 1803. Paggen William Mayo (1766-1836) was a Fellow of the Royal College of Physicians. Galtonian lecturer in 1788, Harveian lecturer in 1807 and physician to the Middlesex Hospital from 1793. Charles Mayo (1788-1876) completed his medical studies at St. Bartholomew's Hospital in 1810, became a member of the Royal College of Surgeons in 1812, and a Fellow of that college in 1843. He was chief surgeon of the hospital at Winchester, England, from 1811 for more than fifty years. Thomas Mayo (1790-1871) was a Fellow of the Royal Society, Fellow of the Royal College of Physicians, member of the Staff of Middlesex Hospital for many years and for five years President of the Royal College of Physicians of England. Herbert Mayo (1796-1852), a brother of Thomas, was a Fellow of the Royal Society, Fellow of the Royal College of Surgeons, Hunterian professor of anatomy at the Royal College of Surgeons from 1828 to 1829 and professor of anatomy and physiology of King's College from 1830 to 1836. In the latter year he was one of the founders of the Middlesex Hospital Medical School. He did much original and sound work in the elucidation of the physiology of the fifth and seventh cranial nerves.

William Worrell Mayo received his early education at Owens College, now the University of Manchester, where he was a pupil and protégé of the famous physicist John Dalton. His special college training was in physics and chemistry.

When Mr. Mayo was twenty-six years of age, in 1845, he came to New York City, where he remained for two years in the practice of chemistry, and served as instructor in chemistry and physics in the Bellevue Medical College. In 1847 he removed to Lafayette, Indiana, where he studied medicine with Dr. Eleazer Denning as his preceptor for two years. In 1849 he went to St. Louis, where he continued to work in chemistry while completing his medical studies in the

TABLE I

Case N	Op e r	S Y S T O L I C B L O O D P R E S S U R E								D I A S T O L I C B L O O D P R E S S U R E							
		B f	I d t	5 m	3 m	45 m	6 m	Le O R	I m	B f	I d t	5 m	3 m	45 m	6 m	Le O R	I m
6946	Dr a g k		58	24	78			16		76	88	0				8	
6947	P l p	54	8	47	6	5	5	25	46	8		0	0	8	80	8	76
6905	App e d e c t o m y	5	4	36	36			3		7	26	0	06				0
6987	Pl a s t o m	5	5	45	35	3			8		5	5	0		0	0	05
6946	Thy r d t m y	8		15	55	45		4		8	9			3		5	80
58783	Exc y t t h a	6	5	6	6	4		5		67		74	8	74		80	
663	Thy r d e c t o m y	3	90	7	05	4	3	3		80				9		08	
550	R p e g m a s t d		6	8		6	6			6	8	9	60	5	56		80
6905	H p l a s t y	48	5	5		6				88	84	8	76	6			8
5474	App e d e c t o m y	3	3	4	4	8			6	8	85	88	88	86			84
8062	Thy r d t m y	34	94		6	4				4	3	4	3	8			
804	Thy r d t m y	3	54	64	6	48				8	9		9	9			

Case N	Op e r	P L S								R 184							
		B for	I d t	5 m	3 m	45 m	6 m	Le O R	I m	B f	I d t	5 m	3 m	45 m	6 m	Le O R	I m
6946	D n a g k	4	5	4							8	4	8				
6959	P e r n e l p	96	9	64	7	7	7	7			8	8	3	3	3	3	4
690	App e d e c t o m y	8	96	96	94												
6987	Pl a s t r m				4	4	4	4									
6946	Thy r d t m y	74	74	9	9	85		8	83	8	8	5	6	5		5	8
58783	Exc y t t h	68	88	80	88	8				8	8		4				
68	Thy r d e c t o m y	6	65	7	65	6	65	6			4	6	6		8	4	
378	R p e g m a s t d	7	36	7	7	7	88			6		6	26	8			
695	H p l a s t y	64	64	7	9	84		7									
5474	App d t o m y	96		88	88	88			94	8		5	4	4			4
8062	Thy r d t m y	0		3	4	4					4						
804	Thy r d e c t o m y	5	3	60	5	5					6	3					

repeated use even at frequent intervals does not bring on an increasing dislike of the gas nor does the minor postanæsthetic discomfort tend to become more aggravated. This practice does not lead to the development of a tolerance with a resultant decrease of effectiveness.

As the anæsthetic for opening ear drums in young children ethylene-oxygen has been found entirely satisfactory and is safely employed with very young babies. Here too only very light anæsthesia is required.

For the extraction of teeth this gas appeared far superior to the nitrous oxide-oxygen mixture. Excellent anæsthesia has been maintained with the nose piece over a considerable period the

patient meanwhile not suffering from any degree of cyanosis.

USE IN MAJOR SURGERY

Of these 2750 cases recorded 141 or 51.61 per cent were classified as major surgical procedures. These included 412 thyroid, 379 abdominal, 123 urological, 116 orthopedic, 95 gynecological, 70 breast, 45 mastoid, 21 rectal, 20 chest and 8 brain operations. In addition there was a group of 132 which did not fall into any of the general classes of this major division. There were 662 male and 759 female patients. The ages of the patients ranged from 3 to 78 years. In 1290 cases the anæsthetic was given by professional

an average of 2 14 ounces of ether and 54 per cent of the latter requiring an average of 2 25 ounces. Of the hernioplasties and appendectomies approximately 18 per cent required an average of 2 ounces of ether. While the failure of an anæsthetic medium to give completely satisfactory relaxation in 28 4 per cent of the abdominal cases may seem a considerable indictment the amounts required were rather small and the cases which represented the largest percentages were those in which complete relaxation even with ether is most difficult to obtain. No attempt has been made to struggle through an operation rather than use ether, for the combination of the two mediums when necessary has been entirely satisfactory and the continued use of ethylene oxygen following the use of ether aids in the more rapid elimination of the latter so that the post anæsthetic nausea and vomiting are not greatly if at all aggravated by this addition.

The ages of the patients in this abdominal group ranged from 6 to 77 years.

Of the 123 urological operation there were 3 suprapubic one stage prostatectomies 16 nephrectomies 12 first stage and 1 second stage prostatectomies and 10 nephrotomies. The remainder of this group was made up of a rather wide variety of operations. As has been previously pointed out by other observers ethylene is especially valuable in this branch of surgery because many of the patients falling in this division are well advanced in years and come for treatment only after considerable kidney damage has occurred. With many of these patients with prostatic enlargement and accompanying urinary tract infection the functional activity of the kidneys is very low. In addition to this the age of the patients makes hospitalization except under the best of care a dangerous procedure because of pulmonary complications. The use of ethylene oxygen rather than ether relieves both the kidneys and lungs of the added chemical irritation. With these patients too the fluid intake is especially important. With ethylene anæsthesia it is possible to begin fluid intake by mouth almost immediately postoperatively. If nausea and vomiting occurs it is seldom of a serious character and usually short in duration as compared with that following the administration of ether. Maintenance of body fluids is extremely desirable with all of these patients. The use of ethylene results in much less loss by perspiration than that experienced with the use of ether. Relaxation is quite good in most instances. Of this group of 123 ether was given in 14 cases or 11 3 per cent. The average amount used was 2 1 ounces. The ages

of these patients ranged from 13 years to 78 years.

In this series there were 116 orthopedic operations which included 25 major amputations 25 minor arthrodeses arthroplasties or arthrotomies 22 osteotomies 19 tenoplasties 18 open reductions 5 major closed reductions and 4 repairs of hallux valgus. No especial comment need be made concerning the use of ethylene in this group. It was found entirely desirable and the advantages enumerated in the other groups were equally obvious in this one. Relaxation was quite good even where the larger muscle groups were concerned. In 9 of the 116 cases or in 7 6 per cent ether was used to reinforce the ethylene the average amount being 2 77 ounces. The ages ranged from 8 years to 68 years.

Of the 93 gynecological operations 21 were supravaginal hysterectomies with 3 of which appendectomies were done and with 4 of which salpingo-oophorectomies were done 10 were salpingo-oophorectomies with 14 of which appendectomies were done 15 were cervical amputations 14 were perineal repairs 9 were excisions of uterine or cervical polyps 7 were dilatations and curettages 5 were uterine suspensions 4 were interposition operations with perineal repairs and one was a pan hysterectomy. With this group the observations were similar to those made with the other types of cases. When working deep in the pelvis the relaxation is occasionally not so great as may be desired and is less complete than that obtainable with ether. Of these 93 operations ether was used in 21 cases or in 22 1 per cent the average amount used being 2 28 ounces. No especial difference in the amount of bleeding was noted from that encountered with the use of ether. Here the ages ranged from 13 years to 73 years.

Of the rather varied assortment of operations which made up the balance of this major group no especial comment need be made. The advantages enumerated in the various groups above were equally apparent with these and the problem of relaxation was less important.

COMPLICATIONS

The value of any anæsthetic medium must be based on the postoperative effects as well as on the results obtained during the operations. In these studies no postoperative complications involving the cardiovascular genito-urinary or nervous systems were encountered which we felt could in any way be attributed to the ethylene oxygen used. Especial concern was exerted regarding the complications which might arise as

the territory as 4 131 The number of Indians in the territory was estimated at about 25 000 Mail was received only once a week by way of Prairie du Chien

The white population was confined to a small triangle of land between the St Croix and Mississippi rivers This small group of settlers lived in the most primitive of pioneer manner But the bulk of them were honest and God fearing The first territorial legislature in 1840 pas ed an act to establish and maintain common schools Another act forbade the sale or giving of liquor to Indians, another established the liquor license system A very stringent Sabbath law was passed The second legislative session of 1851 passed a bill to incorporate the University of Minnesota In 1850 a steamboat with very light draft proceeded up the Minnesota River into the rich agricultural territory to the west of the Mississippi The possibilities of this country were well known to the settlers and now that the navigability of the Minnesota was demonstrated agitation was begun to purchase the land west of the Mississippi from the Sioux This was done by the treaty of Traverse des Sioux which was signed July 23 1851 and ratified by Congress June 23 1852

About the only products which the United States east of Chicago had ever seen from Minnesota were furs cranberries, and ginseng The settlers were, however raising excellent grains and vegetables and by Herculean effort in 1853 contrived to send to the great exposition in New York City an exhibit of their agricultural products These were so good that they greatly surprised the eastern seaboard and turned marked attention to the new territory of Minnesota The next year the track of the Chicago & Rock Island Railroad was completed into Rock Island on the east bank of the Mississippi This was deemed so important an event that it was celebrated by a steamboat excursion to St Paul It was thus demonstrated that when navigation was open St Paul was within thirty hours mail service to Chicago and four days to Washington

With the opening of navigation April 17, 1855, the first steamboat to St Paul brought 814 passengers Dr Mayo and his family were among these It was estimated that there were 40 000 people in the territory at the close of 1855 They came in largest numbers from the state of New York then from Ohio Indiana and Illinois and from New England They built log houses for dwellings and for schools

But these pioneers were young hardy adults who had come to a new country to seek their fortunes They were widely distributed over undeveloped territory They were not prone to sickness and had no time to imagine ill Even when really sick lack of transportation made it necessary for them to cultivate their own medical resources

Such a country was no place for a young doctor to prosper in his profession and Dr Mayo after establishing his family in St Paul was no doubt glad to accept a position with the Northwest Exploring Company on an expedition to

1421 major operations nausea and vomiting occurred in 563 cases or in 39.6 per cent. The average number of times the patients vomited was 2.6 and the average duration of the nausea was 11.2 hours. Of the various types of operations those on the gall bladder had the highest percentage of morbidity 62.2 per cent of the 98 patients having nausea and vomiting over an average period of 18.1 hours. The average number of times vomiting occurred was 3.7. It is to be noted that of this group of 98 patients 49 were given ether in variable amounts during the operation. The average duration of these operations was 61.6 minutes.

The duration of nausea and the number of times vomiting occurred varied with the various types of operations as shown in Chart 2. As will be noted the patients having thyroid operations were second to the gall bladder cases in the percentage having nausea and vomiting. The duration however was not prolonged. It may be seen also that while the average duration of nausea with those having stomach operations was second to the gall bladder cases with 17.6 hours the number having nausea and vomiting constituted only 27 per cent of the total. The group in which the lowest percentage of nausea and vomiting occurred is a rather miscellaneous one including operations for hernia, varicose veins, breast tumors, mastoid infections, pleural infections and other types of disorders which did not fall into any of the more distinct groups. With these 21.5 per cent had an average duration of nausea of 7.1 hours and vomited two times as an average.

As will be noted the duration of the vomiting was seldom prolonged. The character of the vomiting was usually mild and rarely was it of a degree to result in any especial weakness or muscle soreness.

In the foregoing discussion comparison of the relative values of ethylene and nitrous-oxide gases has purposely been avoided. Combinations of the latter with oxygen undoubtedly have a definite function to fulfill. As noted above the use of ethylene is absolutely contra indicated when the cautery is being used when the X-ray or fluoroscopic machines are in use, etc. When gas is desired under these circumstances nitrous oxide is of great value. The immeasurably greater margin of safety with the ethylene from the standpoint of the cardiac and respiratory mechanisms makes it by far the anæsthetic of choice. We feel that ethylene has all the advantages of nitrous oxide with the additional advantages of producing more adequate relaxation and at the same time

of being much more safe even in the hands of the average good anæsthetist.

Mention should be made concerning the expense of using ethylene oxygen anæsthesia. From the total time required for the 150 operations reviewed it has been computed that the cost per minute is approximately $7\frac{1}{2}$ cents or about $4\frac{1}{2}$ dollars per hour. This cost of course is considerably greater than that of ether but is about equal to the cost of nitrous oxide oxygen anæsthesia.

CONCLUSIONS

1 Combinations of ethylene and oxygen have added an extremely valuable and satisfactory anæsthetic medium to those already in use.

2 The explosibility of ethylene and oxygen is a real source of danger and precautions must be taken.

3 No excessive use of opiates is necessary to make possible satisfactory induction and anæsthetizing.

4 The induction and the regaining of consciousness are rapid each requiring only a very few minutes.

5 The odor of ethylene is not a contra indication to its use.

6 Satisfactory relaxation can be maintained with ethylene oxygen in most instances.

7 The gas does not act as a cardiac or respiratory stimulant or depressant in amounts used for anæsthesia.

8 Blood pressure is not affected by the gas.

9 Bleeding in the wounds is not more than that ordinarily encountered.

10 Ethylene oxygen is equally satisfactory for use with the very young or with the aged and is especially valuable with debilitated individuals.

11 Repeated use at frequent intervals does not decrease the potency of ethylene or increase the postanæsthetic nausea and vomiting.

12 The anæsthesia produced is equally satisfactory for minor surgery and major operations.

13 Postanæsthetic pulmonary complications are rare.

14 Postanæsthetic nausea and vomiting occurred with 39.6 per cent of major cases. Vomiting is usually mild and duration of nausea not prolonged.

15 It is believed that the margin of safety with ethylene as compared with nitrous oxide is very much greater.

16 Cost of ethylene-oxygen anæsthesia is about $7\frac{1}{2}$ cents per minute.

We are indebted to Dr. R. D. McClure for his co-operation in the preparation of this report.

to child hearing and the accidents associated with rough frontier life. It must be kept in mind that the people of the community during this period were, for the most part young healthy adults thriving on plentiful food and fresh air but because of the panic of 1857 and the distance from market having very little money even for the necessities let alone the "luxuries" of illness. And then came the Civil War.

In the summer of 1862 the Sioux Indians seized the opportunity afforded them by the absence at war of most of the male members of the population to attempt to recover their lands from the white settlers. A general uprising and massacre of the whites occurred in the vicinity of New Ulm which was the rallying point of resistance of the settlers. Dr Mayo, then forty three years of age accompanied a relief force to New Ulm as surgeon. Shortly after this he received his appointment as provost surgeon for southern Minnesota in charge of recruiting stations for the Civil War. Early in the spring of 1863 he moved with his family to Rochester, Minnesota as a more advantageous point for recruiting.

Rochester (population 2663 in 1865) was in every respect a much better town than Le Sueur. Recognizing this soon after coming to Rochester Dr Mayo bought land and established a home on the ground on which the Mayo Clinic Building now stands. In addition to his draft board duties he rapidly became the leading physician and surgeon of Olmsted County. As an evidence of his continued scientific interest when in December 1863 a number of Indians convicted of massacring whites in the vicinity of New Ulm a year previously were hanged Dr Mayo obtained possession of the body of one of them Split Nose. He carefully dissected the body cleaned and articulated the skeleton which he later used for teaching osteology to his two sons William J and Charles H Mayo. By 1871 he had prospered sufficiently so that he felt he could afford to take a postgraduate course in medicine in the Bellevue Hospital in New York.

Dr Mayo was one of the first physicians in the West to invoke the aid of the microscope in medical work and to become expert in its use. While his sons were still in high school about 1878 (?) he even mortgaged his home in order to get money to buy a new and improved microscope. This incident also sheds light on another phase of his character. With all his wonderful ability as a physician and surgeon and his extensive practice which kept him going almost night and day he was a notoriously poor collector of fees. Indeed his old driver and henchman Jay Neville used to grow quite profane at times over remembrances of the Doctor's failure to make his patients pay up. Like all frontier practitioners of that day he had done a large share of emergency surgery since coming to Minnesota. In 1871 he performed his first laparotomy for ovarian tumor. The patient was a woman aged forty six wife of a blacksmith who under Dr Mayo's instruction made some of the instruments with which the operation was performed. During the next thirteen years he performed thirty six similar operations.

RADIUM THERAPY IN SOME OCULAR CONDITIONS¹BY WALTER SCOTT FRANKLIN M.D. F.A.C.S. AND FREDERICK C. CORDES M.D. SAN FRANCISCO
CALIFORNIA

In addition to its use in malignant ocular conditions radium has in recent years been applied to benign ocular lesions as well. There has been a lack of uniformity in the results obtained so that the value of radium in ophthalmology is still extremely doubtful in the minds of many.

As Lane² pointed out much of the experimental work done on the use of radium in the region of the eye is of no practical value today because of the change in the types of screens this change being the result of our increased knowledge of the effect of radium. There have been numerous clinical reports of its use in various ocular conditions. A review of these in most instances is of little value due to a lack of detail of the method employed. Important items such as the amount of radium type of container whether element or emanations screening type of applicator distance time and details of application have often been omitted.

That radium has a definite place in ophthalmology there can be no doubt. As Lane states more careful clinical reports must be presented in order that we may arrive at a better standard to serve as a guide in the treatment of various conditions.

We are presenting a few cases of ocular lesions treated with radium. While we realize that these cases are more or less isolated ones the results have been definite enough to warrant the assumption that the effect obtained was due to the therapy applied. We hope this paper may stimulate more work with the detailed recording of the methods employed so that a better knowledge of radium therapy may be obtained.

We have been guided by the advice of Dr. L. R. Taussig of the Department of Dermatology as to the dosage and screening.

Only the positive findings have been noted in the following case reports.

CONJUNCTIVITIS

CASE 1 Mrs. J. F. M. 67 years of age had been under observation for 11 years with a persistent chronic conjunctivitis the result of the cicatricial changes of a traumatic contracted in childhood. There was a definite conjunctival hypertrophy accompanied by dilated ocular blood vessels and mucopurulent discharge. Bacteriological examination showed staphylococcus in pure culture. All the usual therapeutic measures including vaccines had

been tried with only mild relief from time to time. The patient had seen many oculists here and abroad without permanent improvement. December 14, 1925, radium was applied. Ten milligrams of the radium element in an 0.8 centimeter circular plaque screened by 0.5 millimeter silver and a piece of rubber dam was applied over the closed lids for 1 hour at a distance of 1 centimeter. The applicator used was the type described in our work on cataract.³ This was repeated twice a week to each eye for a period of 4 months. At the end of this time the condition was markedly improved. There was no discharge present and the lids had lost the thick puffy appearance they previously possessed. In addition the ocular conjunctiva was now pale.

CASE 2 Miss M. C. age 55 was seen in August 1922 with a bilateral acute conjunctivitis that proved most resistant and developed into a chronic type with considerable hypertrophy and mucopurulent discharge. In addition the bulbar blood vessels were markedly injected. After 6 months of unsuccessful treatment with the usual therapeutic agents the patient disappeared to return in June 1923. Treatment elsewhere had been of no avail and the condition remained the same. Radium was applied June 23, 1925, the method being identical with that of Case 1. After 6 months therapy the condition had improved to such an extent that the conjunctivitis (including the bulbar) was practically normal.

VERNAL CONJUNCTIVITIS

CASE 3 Lionel C. B. age 11 was referred by Dr. A. C. Macleish of Los Angeles who felt the cooler climate of San Francisco would have a beneficial effect on the boy's case of aggravated vernal conjunctivitis. In addition to the use of copper sulphate and silver nitrate therapy radium had been applied but was discontinued after a severe reaction. October 19, 1925, radium therapy was instituted twice a week to each eye the dosage and method being identical with that in Case 1. The condition improved very materially the first months probably in part as a result of the change in climate. Following this the improvement was very slow. We advised a stronger dosage and on April 23, 1926, applied the above plaque of radium screened only with rubber dam directly to the everted lids for a period of 1 minute. Because of the size of the plaque two applications were necessary to cover the entire lid. April 23 the other eye was similarly treated. On June 21, 1926, the same procedure was repeated on each eye. There was no acute reaction following this type of application. The patient returned to Los Angeles the latter part of June. On September 11, 1926, Dr. Macleish writes that the lids are decidedly better than when he went to you but the eye are several nodules still present. The radium therapy will be continued under the direction of Dr. Macleish.

RECURRENT PTERYGIUM WITH HYPERTROPHY

CASE 4 Mr. J. P. age 48 reported to the clinic October 10, 1925, with the following history: Twelve years previously a rapidly growing pterygium in the left eye was operated upon and gradually recurred. The patient had

When we attempt to sum up the incidents in the life of Dr. William Worrell Mayo we are struck by the fact that here was a man who had inherited excellent family traditions from the scientific standpoint, whose personal training in fundamental sciences was unusually good for his day and place and yet who for years after the time he was legally qualified to practice the profession of medicine was so buffeted by the circumstances of fortune—the burning down of his school property in La Porte the loss of his claim where afterward was erected the city of Duluth the financial stringency following the panic of 1857, the failure of the country around Le Sueur to develop according to general expectation the advent of the Civil War with its terrible strain on the pioneer settlers in southern Minnesota—that despite his unusual qualifications and his utmost efforts yet was barely able to support his family. In many respects this part of his history reminds us of a like period in that of Ulysses S. Grant. When some measure of prosperity began to arrive in Rochester and the surrounding country after the Civil War despite the fact that he was then forty-six years of age his breeding his education, and his training in adversity gave him at last the opportunity to be of great service to his community. His determined purpose his ripened judgment, his rare skill and his fertility of resource made him an outstanding surgeon of his time and place, a broad physician and a powerful and much respected citizen of his state. Not the least of his services to humanity was, taking heed from the grievous delay of his own opportunities that he began their training for the profession of medicine at the earliest age of his two gifted sons, William James and Charles Horace Mayo.

LOUIS B. WILSON M.D.

SHORTENING OF BONES OF THE LEG TO CORRECT INEQUALITY OF LENGTH

By JOHN A BROOKE M D PHILADELPHIA

FOR more than half a century, surgeons have considered it feasible in certain cases to correct inequality of leg length by operative procedure. The early attempts to correct this asymmetry were those of shortening the normal leg rather than to lengthen the short limb. Successful operations of lengthening shortened legs have only been performed during the past few years since the development of aseptic bone surgery. Which of these two procedures is the most advisable to follow would depend somewhat upon the patient's height. If the individual is nearly 6 feet tall and especially if it be a woman one could unhesitatingly recommend a shortening of the bones of the normal leg but on the contrary if the height is but 5 feet 3 or under one would be slow to suggest further shortening of 2 3 or more inches.

The operative lengthening of the femur is a decidedly major operation attended by tremendous shock and by much trauma of soft tissues favoring infection the cases selected must of necessity be only the young and vigorous.

Schede and also von Eiselsberg nearly 20 years ago resorted to a zig zag osteotomy with strong postoperative traction to gain the required length. No report of these cases is obtainable but the method was apparently not of sufficient success to be generally followed.

Codivilla described lengthening of the extremity by a method which was the first application of a steel pin through bone.

P B Magnuson¹ in an article entitled "Lengthening Shortened Bones of Leg by Operation" gives the results of his experiments on dogs. This report is one of the first published in accordance with our present views on bone surgery. He gives his indications for the operation and states that the vessels and nerves stand the stretching process to a considerable degree. A Z-shaped osteotomy was done traction applied for several minutes and the lengthening obtained was maintained by ivory screws inserted through holes drilled then threaded. The ivory screws are absorbed and do not act as a foreign body.

In 1916 R Tunstall Taylor² reported a case of lengthening of the femur in a girl of fifteen. His

method was similar to that described by Magnuson. He used bone pegs instead of ivory screws.

V Putti³ in 1921 gives his method of lengthening the femur. He does a Z shaped osteotomy with a motor saw. The traction force for stretching the soft tissues is obtained by his osteotome which is a telescoping tube screwing in or out and is attached to pins fixed in both proximal and distal ends of the bone. The force is powerful and is applied directly to the skeleton and increased from day to day. He reports operations upon ten cases by this procedure and in some cases an integral lengthening of more than 3 inches.

I am sure that such results as obtained by Putti can be accomplished only by one having unusual skill and masterful technique and unless we are sure of an appreciable lengthening by this operation, which is a severe one we are not justified in recommending it to the patient. For the average surgeon operative shortening of the opposite femur when this is found advisable should be the choice. It is simpler much less dangerous and decidedly accurate for shortening can be figured to one eighth of an inch.

The earliest report of operative shortening of the femur was by Sayre in 1863. The method used was an osteotomy allowing the fragments to override. This same procedure with a transverse or oblique osteotomy or a resection of a portion of the shaft without internal fixation of fragments was followed until a rather recent date.

In 1908 P Glaessner⁴ reported three cases of shortening of the femur treated in Hoffa's clinic by oblique osteotomy and continuity resection.

The first was an old intracapsular fracture of the neck of the femur. Operation oblique osteotomy of sound femur bones over riding until legs were of equal length. Good recovery but shortening is still noticeable.

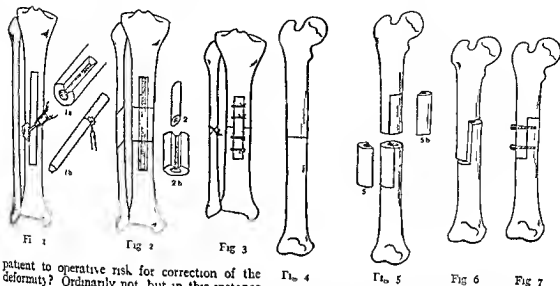
A second case was a congenital hip dislocation. The same operation was done as Case 1. The gait was improved. No mention is made of improvement in leg length.

The third case was a fracture of the femur. Operation consisted of resection of a portion of the shaft and coaptation of bone ends by silver wire. Result was good legs are equal in length.

Heine⁵ method was similar but he states that the result is uncertain because bone suture does

¹ N. Y. Med. J. 1908, 203
² Am. J. Orthop. S. 2, 96

J. Am. M. Ass. 19, 5 pr
Zisch, 1, 17th p. Ch. 908
Zisch, 1, 17th p. Ch.



patient to operative risk for correction of the deformity? Ordinarily not but in this instance equality in leg length had to be obtained or the patient must give up his vocation.

The two most evident dangers of the procedure were first infection second non union. With the modern bone technique the first danger was reduced to a minimum. Non union occasionally occurs in fractures of the tibia in its lower third rarely in its middle third. The chief nutrient artery of the tibia enters the shaft posteriorly in its upper third just below the oblique line and is directed obliquely downward. It would consequently be cut off by fracture or bone section of the middle or lower third. The additional blood supply entering the tibia from the periosteum is apparently sufficient for bone repair after most fractures of the middle third.

E. L. Hason¹ had made an investigation of the blood supply in the lower third of the tibia. With reference to its bearing on cases of non union of fractures of this region he points out that the anterior tibial artery is the source of the greater proportion of the blood supply to the lower end of the tibia. The artery lies immediately against the tibia with no intervening muscle protection. This position exposes it to injury from bone fragments in fractures, thrombosis or even laceration of vessel wall may result. The arterial anastomosis of the ankle and foot is a rich one nevertheless the lower end of the tibia comes in for a very small part of it.

With ordinary care and especially when the operative shortening is of the middle third of the tibia we may conclude that the danger of non union is very slight indeed that the method out-

lined above can be recommended because the operation presents no technical difficulties, and because there is a mathematical certainty to the shortening. We feel that the tibia and fibula could with safety be shortened $\frac{1}{2}$ inches. Beyond that point there may be some question as to the muscle and tendon slack interfering with full power and there would also be an unsightly disproportion between the length of the thigh and the leg. The most advisable place for shortening is the middle third.

Since the case cited above and operated upon in January 1911 we have used the same procedure to secure equal leg length in a case of residual paralysis of anterior poliomyelitis a shortening of a little more than 2 inches being done on tibia and fibula of the unaffected leg.

Shortening of the femur is an operation more frequently called for and we do not hesitate to advise it in suitable cases. The indications for its use are found in those of more than 1½ inches shortening the result of congenital abnormalities, bone disease with destruction and fractures with overriding.

The method we have employed is as shown in Figures 4 5 6 and 7. The ordinary step method of shortening is used. The shaft of the femur is reached through an incision on the outer side of thigh 6 7 or 8 inches in length the length of the incision being governed by the amount of shortening required. The fibers of the vastus externus are separated the vastus intermedius is incised the femur is bared but care is exercised not to denude the bone of its periosteum. A broad pliable strip of metal is passed back of the femur

REVIEWS OF NEW BOOKS IN SURGERY

A VADE MECUM of the clinical aspects of syphilis has appeared which takes its rank as one of the outstanding contributions to medical literature during the present year. The qualifications and experience of its author Dr Stokes require no comment.

The book furnishes a long but until now an unfilled need of every student of medicine whether he be a general practitioner or specialist in that it furnishes a clinical background for the understanding of the disease. In its correlation of the protean aspects of the disease it stands as an unique and original contribution to the field of syphilology.

The author has adopted and consistently followed an admirable plan for the presentation of his subject. The first five chapters deal with the fundamentals of diagnosis and treatment. There are seven chapters alone on the actual treatment of the disorder and great care has been taken to include in a logical way every detail from the drawing of blood for a Wassermann to intraspinal therapy.

The newer preparations bismuth and tryparsamide are fully discussed as are the dermatological aspects of syphilis.

There are complete chapters on syphilis of the bones, the cardiovascular nervous and gastro-intestinal systems and special chapters on syphilis of the liver and spleen. Familial and prenatal syphilis are discussed thoroughly. The book is replete with some five hundred excellent photographs illustrative of cases and conditions noted in the text.

Much emphasis has been placed on the early recognition of the disorder and to that end the technique of a dark field examination, the Wassermann reaction and the value of routine spinal fluid examination. The high standard which the author sets may not be reached by all who undertake the treatment of this disease but nevertheless it will serve as a goal.

All in all it is a monumental work and its general reading will do much to stimulate the profession to a higher plane in the detection and treatment of this widespread malady.

EDWARD A. OLIVER, M.D.

THE treatment of chronic catarrhal deafness³ is unsatisfactory and disheartening. There are several causes for this. The range of hearing of which the ear is capable far surpasses the range necessary for voice perception so there is possible a considerable loss before the hearing for voice is affected and it is chiefly with this that the patient

is concerned. Again with good perception present in one ear the patient often disregards even a serious loss in the other. So it often happens that the deafness is well advanced before the sufferer comes into competent hands and the otologist is faced with fixed pathological changes which it will be practically impossible to correct. The pathogenesis of some cases of chronic progressive deafness is not clear. Accordingly any method no matter how empirical which promises to restore even a modicum of hearing is to be enquired into if vouched for from a reliable source. The reader of Dr Cathcart's book is convinced of the earnestness with which his work has been carried on and so inclines to listen with attention to what he has to say, especially as he states that he has benefited by this treatment.

The method of Zund Burguet is based on an attempt to re-educate the hearing sense. It is not claimed that it is a curative agent only that it will alleviate. There are two essential factors. The primary current of the electrophone produces sound vibrations of varying intensities through the range of hearing from 80 to 3,500. These sounds conveyed to the ear by a telephone receiver are of a quality resembling those of the voice and their amplitude can be varied. At the same time a second current transmits a gentle disturbance of the air which produces a vibratory massage of the whole auditory tract. What is meant by this latter statement is not quite clear. That vibratory massage can be produced in the conducting mechanism is recognized and used but a vibratory massage of the whole auditory tract extending as it does to the temporal lobes the reviewer finds difficult to visualize. The method is said to be beneficial in nerve deafness and in all forms of conduction deafness including otosclerosis and chronic catarrhal deafness. The full course is 30 sittings and 12 at least are necessary before a prognosis regarding possible benefit can be given. When improvement results it lasts as a rule from 6 to 9 months and then another course is required.

The treatment produces some curious results. While the hearing for voice is markedly improved that for whisper is relatively little improved or not at all. However much the patient may improve for the voice his range of hearing remains the same for the tuning forks. The watch and acoustometer I consider useless tests for any practical purpose in these cases and never employ them. In fact I have had to advise patients not to use their watches for testing their hearing several times a day and have explained to them that whether they heard the watch—or thought they did—better or worse was of no importance from one point of view as the voice was the only important thing to hear but it was important from another point of view because if they thought they did not hear it they worked

¹From LINGEN, SYRPHOLOG, D. O. O. S. THE NEW YORK
 MED. Soc. By John H. Stokes, M.D. (a. k. a. the upper two F.F. I.A.
 O. Leary, M.D. (a. k. a. the lower two F.F. I.A.)
 M.D. Love, W. Sh. for
 M.D. and J. White, M.D. Philadelphia and Lond. W. B.
 S. & Co. Company 926

THE TREATMENT OF CHRONIC D. F. N. S. THE EFFECT OF A
 METHOD OF D. B. G. C. By George L. Cathcart, M.A. M.D.
 N. W. Y. & Co. d. L. s. v. e. r. y. P. r. e. s. 90

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

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MAY 1927

THE VALUE TO THE SURGEON OF THE SENSE OF SMELL

NINETY FIVE per cent of man's information is obtained either directly by visual means or indirectly through visual training of the other senses.

The cerebrum is the ganglion of all distance receptors and is the seat of the intellectual functions. The primitive cerebrum of the vertebrates was developed from the olfactory ganglion. The great expansion of the cerebral cortex in the higher mammals and especially man is dominated by visual necessities and controls consciousness while the sense of smell has become less important. The neopallium that great portion of the brain which had its origin outside the olfactory ganglion is the mechanism which carries on vital processes.

The two most important steps in man's elevation above the brute were (1) co-ordination of the growth of the cerebral cortex with the development of the sense of sight and (2) the assumption of the upright position which freed the hands for training through the sense of sight. Only man and some of the higher mammals have achieved direct communica-

tion between the sense of sight and the cerebrum.

In lower animals all the senses with the exception of the sense of smell are relayed so to speak through various ganglia before reaching the cerebral cortex with all the possibilities of confusion and misinterpretation which this method entails. In them the sense of smell is dominant over all the other special senses including vision and controls behavior but it gives no estimation of time, space or motion.

The sense of smell is dependent on bundles of olfactory nerve cells each of which ends in a hair. At the base of the bundle are pigmented cells. Just what the use of the hair endings is in the sense of smell we have no means of knowing positively but our knowledge of the antennae of the radio little as it is leads us to believe that electronic vibrations of colloids and unstably oxidized molecular bodies coming into contact with these areas are recognized as odors either by their size or their rate of speed just as length and speed of rays of refracted light are recognized by the eye as colors. It is probable that the pigmented cells at the base of the olfactory bundle are necessary to transmit impression of odor to the cerebral convolutions where they are recognized. Albino animals have no sense of smell and are sent to the butcher because eventually they would die from eating poisonous material indiscriminately.

In the nasal cavity of man there is only about one square inch of olfactory pigmented cells, a very small amount as contrasted with that of many of the lower animals who have a more highly developed sense of smell. The

and a duodenectomy for a duodenal ulcer? Men of wide experience differ very materially. *Flausterer* von Haberer, *Moyrhan* and others are expoents of radical surgery while *Sherren*, *Walton*, *Paterson*, *Balfour* and others still favor conservatism. A study of their statistics is interesting as each can prove excellent results with his own form of treatment.

*Pannett*¹ in a recent monograph attempts to clarify the matter. The author summarizes the present day information on etiology, pathology and symptomatology of peptic ulcer and after quoting other surgeon's opinions gives his personal deductions as to treatment. He is inclined toward radical surgery since it is the reviewer's opinion that the removal of the duodenum for an adherent ulcer is the most radical type of surgery. The author favors sleeve resection or the *Peau* operation for gastric ulcer and excepting rather vague contra indication duodenectomy for duodenal ulcer. The observations and remarks on perforation and hemorrhage are interesting.

In the light of some recent observations a word of warning should be voiced since in a high percentage of cases in which an extensive stomach resection has been done a severe type of anemia has developed. Attempts at more conservative surgery should be made since the removal of a large segment of the gastro intestinal tract is not economically sound. It is the reviewer's opinion that we are substituting technical surgical dexterity for deeper study into the cause of peptic ulcer, its effect on function and its mechanism of symptom production.

JOHN A. WOLFER

It would appear that in America the surgery of childhood is not stressed to the extent that it is in England and yet the children in England or on the continent probably receive the same or not as good care as they do in America. General economical conditions play a vital rôle in determining the outcome of all diseases of children. Wholesome and uncontaminated food, sunshine and good hygienic conditions play an essential part in the welfare of the healthy as well as of the sick child. So far as the reviewer knows no medical school in America gives a specific course in the surgery of childhood but many surgeons who hold staff positions in hospitals for children give this subject its proper place in teaching. The surgery of childhood is peculiar in that the infant or child is subject to certain diseases the subjective symptoms of which

cannot be ascertained because of the absence of speech or the lack of co-ordinate thought.

Fraser in his recent two volume work² gives to the surgical profession the precise information which he has acquired in the treatment of surgical conditions in children. He attributes much of his success and knowledge to Sir *Harold Stiles* his teacher a pioneer in pediatric surgery to whom he dedicates his work.

The author aptly states in the chapter on general considerations. The activity of the growth and development of children has a powerful influence upon disease. It is this which renders children liable to be affected by slight causes and makes disease sudden in its onset, short in its course and intense in its symptoms. This influence is especially important in relation to the nervous system for the activity of this system in healthy children often causes a trifling illness to assume an aspect of the greatest gravity while the nervous depression which accompanies chronic wasting diseases may so obscure symptoms that a dangerous intervention after time may appear trifling or may remain altogether latent. Further on he states. The clinician will do well to remember that the inattentive expression of disease in infants possesses one outstanding advantage—it is honest. An infant's philosophy may be summed up in the statement. All that is painful is evil while all that is pleasant is good. These statements sum up much of the fundamentals of the surgery of childhood.

The author depends in a measure upon the reader's general knowledge of surgery and the other special branches of medicine and includes those facts which are peculiar to childhood surgery or those procedures and deductions which present variations from adult surgery. The chapter on fractures is brief but lucid. The chapter on tuberculosis of bones and joints is comprehensive, clear and concise. Even by surgical rickets is unusually well covered. Some disappointment might be voiced in the brief way in which the surgical conditions of the neck and face are described. The same may be said of empyema.

When one considers the tremendous amount of material to be covered and the plausibility of omitting facts which are common knowledge to the general surgeon it will seem that the author has given to the profession a very valuable and compact monograph on the subject of the surgery of childhood.

JOHN A. WOLFER

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FRASER
NEW YORK

tendon is surrounded by a synovial sheath, the repair may be delayed somewhat.

In case of division of a peripheral nerve a primary nerve suture should always be attempted. Contused and crushed portions of the nerve should be removed until normal funiculi herniate from the ends. One of the most important things in nerve surgery is to restore the nerve pattern. The segments of the nerves should not be rotated. They should be fixed by two stay sutures placed at corresponding points of the segments so that no rotation—thus causing distortion of the nerve pattern—can occur. This is how

ever merely good surgery in which an attempt is made to restore as nearly as possible normal anatomical relations. The epineurium should be completely closed for if developing neurofibrillæ stray into the surrounding tissues a dense scar may form which will seriously interfere with nerve repair.

Early use of muscles is desirable in such cases and for this reason an elastic apparatus is preferable to rigid splinting in maintaining the neutral or slightly overcorrected position.

Early assumption of function is the *sine qua non* in the two types of reconstructive surgery mentioned above. DEAN LEWIS



Fig. 10. Case 3. Left lateral film taken of patient's admission disclosing huge frontal meningocele originally mistaken for a cholesteatoma. Arrows point to small osteoma regarded merely as a coincidental finding (film reversed and developed).

*Experiences with Orbito-Ethmoidal Osteomata Having
Intracranial Complications—Harvey Cushing*



WILLIAM W. MAYO
1819-1911

and those who begin with specialization and subsequently squeeze their way from the sidelines into the arena of general surgery—an inconsiderate procedure which those who have started out with a general surgical training naturally decry.

But the difficulty with all this lies in the fact I have touched upon that even the so called general surgeon is prone in course of time to devote himself largely to a particular type of surgery in which he excels. In consequence of this he is likely to overtrain his assistants and pupils in that special field of work and so quite unconsciously no doubt he lets loose on the community a new generation of specialists whether or not they happen to be so designated. The pupils of these men in turn tend to creep back into general surgery sometimes even after their special field has become so well recognized as to secure representation in the Faculty and a place for their subject in the curriculum.

But it is no longer possible to define clearly the limits of one's surgical bailiwick. It is a question of self determination and there can be no more permanency to the boundaries of a surgical specialty than to the boundaries of the Balkan States. It is impossible to stake out permanent claims on the shifting sands of changing custom. Even a simple invention or some novel device may encourage specialization. The eustachian catheter is said to have made otology possible just as the ophthalmoscope made a new order of ophthalmologist. The surgeon had to learn his work anew after Pare rediscovered and vulgarized the ligature. Who can tell what may be ahead of us? Perhaps electro surgery which may supplant the ligature by dehydration and coagulation as certainly as the ligature supplanted the cautery and boiling oil. Who of us knows what discovery may tomorrow entirely revolutionize our craft? We may be sure it will be opposed by those who sit on the Right, as the principles of Lister were opposed.

It was with these thoughts in mind that I have chosen to address you today on a certain topic which distinctly overlaps the fields of three recognized surgical specialties that of the oldest of them all ophthalmology

that of the newest neurosurgery and that of another rhinology. What is more it is a subject which concerns a lesion that in its early stages could hardly have been diagnosed without operation before Roentgen's discovery which has so fundamentally affected our surgical diagnosis and procedures.

The lesions I shall speak about are the pedunculated osteomata of the ethmoid cells which secondarily come to involve the orbit and I shall venture to propose a new method of exposing such of them at least as send projections into the cranial chamber and produce complications there. It is a subject whose literature naturally enough is largely confined to ophthalmological journals since the ophthalmologist for obvious reasons is likely to be primarily consulted and if venturesome and prepared to undertake operations of considerable magnitude he has been the one as the literature makes clear who heretofore has undertaken surgically to deal with the lesion.

Nevertheless in the authoritative works on ophthalmology the subject is dismissed with scant reference beyond a warning against the hazards of operating for other than the more common pedunculated osteomata arising in the frontal sinus with which it is not my present purpose to deal. The operative treatment of the orbito ethmoidal osteomata offers far more serious problems as the four following case histories will make clear. The running comments interjected in the case reports will serve to show what tribulation I have suffered in the process of acquiring some idea of the primary site and nature of the lesion in question and of the varied complications it may provoke.

CASE 1 Surg No 21385 Orbito-ethmoidal osteoma clinically mistaken for a meningioma of the olfactory groove. Transfrontal osteoplastic exploration disclosing intradural projection of osteoma. Removal of tumor through roof of orbit with unavoidable opening of ethmoid cells. Cerebrospinal rhinorrhea. Death from infection and meningitis.

May 19 1914 Admission of Thomas T aged 23 referred by Dr L W Tindolph of Olean New York with the complaint of headache and lateral exophthalmos photophobia and loss of vision.

Inanimesis For a period of about 6 months there had been a slow but steady increase in the

University of Missouri Here, in 1851, he married Louise Abigail Wright, a New York girl of Scotch parentage, born December 23, 1825 Here he was an assistant to Professor John Hodges He received his medical degree from the University of Missouri in 1854

After obtaining his medical degree he returned to La Porte Indiana, and began the practice of medicine. At that time it was generally believed that La Porte would become the great city into which Chicago eventually developed. Indeed Dr. Mayo and Dr. William Byford, later of Chicago, had such faith in the ultimate development of La Porte that they started a medical school in that city in the fall of 1854. During the first term the building and equipment burned and they were never replaced.

Early in the spring of 1855 Dr Mayo with his family consisting of his wife and two daughters drove across the country to Galena, Illinois, and from there traveled by steamboat to St Paul, Minnesota. The reasons for this move may, no doubt, be found in the comparative reputations of Indiana and Minnesota from a climatic standpoint and to the boom which was then in progress in Minnesota. There was much malaria in Indiana around La Porte. Minnesota was known to be free from it. Minnesota also for many years, had been considered to have so healthful a climate that it was 'a good place for the cure of consumption.' But no doubt the principal reason for Dr Mayo's trying his fortune in the new territory of Minnesota was because of the unprecedented immigration to that state in the spring of 1855.

It is impossible to understand the fortunes and misfortunes of the next ten year of Dr Mayo's life without some appreciation of the conditions in Minnesota¹ during the period.

On March 4 1849 the thirtieth Congress of the United States passed a bill organizing the territory of Minnesota. The news did not reach St Paul until April 9 when it was brought up the river by the first steamer of spring.

When the newly commissioned governor, Alexander Ramsey a resident of Pennsylvania was preparing his journey to the territory so little was known east of the Alleghenies of Minnesota that his neighbors inquired whether he would reach it by way of the Isthmus of Panama or whether he would have to sail around the Horn Governor Ramsey reached Mendota Minnesota May 27 1849 and a month later, his residence at the capital of St Paul having been erected in the meantime he and his family were transported there together with all of his belongings in a birchbark canoe St Paul in the winter of 1848-1849 consisted of about one dozen frame houses not all completed and eight or ten small log buildings with bark roofs By the time the governor arrived there were about 150 buildings including those in various stages of erection In July, 1849, the total white population of St Paul was listed as 600 and the total population of

The white population of St. Paul was listed as 900 and the total population of the city as 1,000.

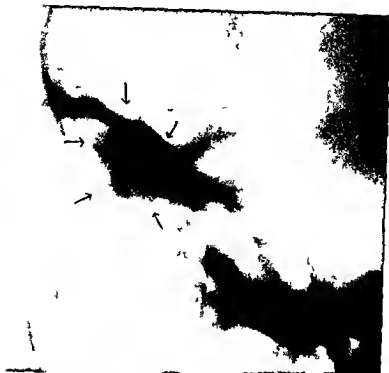


Fig 2 Case 1 One of the right lateral stereoscopic film showing distinct shadow between arrow in region of right orbital roof (in taken for osteosarcoma)

process was confined to the inner side of the orbit in the region of the ethmoid cells which are rarely invaded by meningiomas. Our suspicions consequently should have been aroused.

Moreover at this time I did not fully appreciate that the so called orbital osteomata are isolated and detachable tumors which inevitably originate on the ethmoidal side of the inner orbital wall (lanuna papyracea) and which in the process of their growth push the latter ahead of them. Hence if the orbital contents are really to fall back into place the thin scale of the displaced lanuna must be removed after the tumor itself has been dislodged. Consequently I withdrew from this particular operation leaving not only a direct communication between the open arachnoid spaces and the unroofed ethmoid cells but also a pocket in the back of the orbit to become filled with wound

secretions. A postoperative disaster was thereby courted. To continue with the story.

Postoperative course. For the first 24 hours there was considerable discharge of bloody cerebrospinal fluid from the nose. It then ceased. The exophthalmos which had been present before the operation was slightly increased after the operation and the globe was pulsating due as was supposed to the transmission of the cerebral pulsation to the unroofed orbital contents. The wound healed well and aside from some occasional complaint of headache there were no untoward symptoms for the first week and recovery was looked for.

On the evening of June 5th 8 days after the operation he became drowsy, vomited, had a chill and the temperature rose in a few hours to 102 degrees. The wound was re-opened and a large extradural and retro-orbital abscess was disclosed. A meningitis was already under way and from this he succumbed in about 24 hours from the first onset of these sudden and alarming symptoms.

A postmortem examination revealed an extensive fibrinoplastic exudate over most of the right hemisphere. Cultures showed a poorly growing gram positive coccus in chains possibly a streptococcus.

the northern part of the territory While on this trip he filed a claim on some land opposite the Bay of St. Louis in Minnesota near the present site of Duluth. He was appointed by the territorial governor chairman of the first Board of County Commissioners of St. Louis County and while holding this office located the county seat at a point where the city of Duluth is now built. Dr. Mayo was also appointed by the governor to take the 1855 census in St. Louis County. After completing this and after having his land claim successfully "jumped," he started to return to St. Paul with the Exploring Company. One night a sudden change in the wind sent the blaze from their camp fire into the needles of the fir trees and almost instantly the camp was on fire. All the provisions of the camp were burned. The men themselves barely escaped with their lives. Their compasses and guns having been burned they lost their way and were five days in the woods without food. One of the party became insane and died. The others finally reached St. Paul.

In the year 1855 there were 119 steamboat arrivals in St. Paul from up the Minnesota River. This meant that there was already a very considerable settlement in the rich agricultural lands lying on this river. Among others the town of Le Sueur seemed to give promise of great development. An almost successful effort was made in 1856 and 1857 to transfer the territorial capital from St. Paul to St. Peter near Le Sueur. In the spring of 1856 Dr. Mayo removed with his family to a farm across the river from Le Sueur. The following spring he removed to the village itself. Here he engaged in the practice of medicine but this was not nearly sufficient to require his whole time and he became interested in a small steamer on the Minnesota River. It is worthy of note that at the same time Mr. J. J. Hill, afterward the great railway genius of the Northwest, was also engaged in steamboating on the Minnesota. He and Dr. Mayo then and there began a friendship which continued throughout their lives.

But the land boom of the territory of Minnesota which had progressed until town lots had been sold at from \$1,500 to \$2,000 each in wholly undeveloped town sites and which at no time was greater than in the spring and summer of 1857, was doomed to collapse. On August 4, 1857, the Ohio Life Insurance and Trust Company of New York failed. Before sundown there were suspensions and failures in every considerable town in the United States. The panic struck Minnesota with extreme violence. Everybody was in debt and the territory was literally emptied of money. Business ceased, banks closed their doors, merchants suspended or assigned, city lots became virtually valueless. Thousands who believed themselves wealthy soon found themselves in actual bodily need. The population of St. Paul fell off almost 50 per cent.

Of Dr. Mayo's life during the next five years little record remains. It was no doubt that of the frontier physician among a people whose illnesses were largely those of the communicable diseases of childhood, the conditions incident

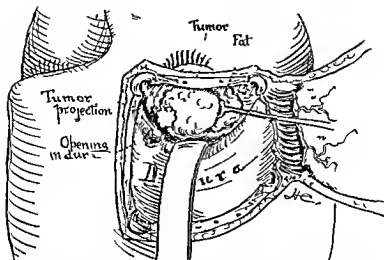


Fig 4 Case 1 Sketch made subsequent to operation roughly to show the field with the exposed tumor and nodule which had penetrated the dura (Reduced 1/3)

cells were promptly opened under novocain with out finding the source of the trouble which soon spontaneously subsided. There were no further symptoms for nearly 2 years when suddenly in April 19 without preliminary aura he had a general convulsion. Subsequent seizures of the same kind occurred in August September and December of the same year.

In April 1923 there was an exact recurrence of the primary episode namely a painful and edematous swelling of the eye with fever. This must have been accompanied by intracranial symptoms which caused apprehension for at this time an emergency trephine opening was made by a surgeon in Galveston Texas in the right temporofrontal region. The frontal lobe was punctured and according to the report an accumulation of air and cloudy serum was encountered and evacuated. Digital examination of the cavity disclosed a bony growth as big as the end of the thumb inside the skull near the mid line above the nose. It was the surgeon's belief that the lesion was in some way consequent upon a former infection of the ethmoid cells. The temporal wound was drained and finally healed.

He made a fair recovery from this operation and remained well for 3 months. He then had three convulsions in succession and not long after there was a repetition of the painful swelling about the orbit which has been described. This attack was more severe than the preceding ones and was associated with bad headaches and vomiting. An X ray was finally taken on October 1923 which disclosed a bony tumor projecting into the cranial chamber in the region of the lamina cribrosa. From this third febrile attack he recovered and aside from periodical headaches there were no further symptoms till

March 19 4 when he again had a succession of generalized convulsions. From that time the convulsions became increasingly frequent and by September they were of weekly occurrence. Because of these attacks he was referred to the Brigham Hospital.

Physical examination. This showed a well set up healthy appearing young man with the above mentioned operative scar in the right temporal region (Fig 6) and a small scar in the mid frontal region ascribed to the trauma received when he was 12 years of age. From a neurological standpoint the examination disclosed merely a questionable diminution of olfactory perception in the right nostril a slight inequality of the pupils the left being larger than the right and a slight exophthalmos with downward displacement of the right eyeball. The fundi oculi were normal visual acuity was unimpaired and the fields were normal. Intra nasal examination revealed no abnormalities.

First comment. Here then was a young man with a story of three attacks of acute swelling of the orbital tissues. After one of these episodes an operation on the ethmoid cells gave negative findings after another a craniotomy disclosed a frontal abscess (?) containing air and fluid after the third the swelling spontaneously subsided. In addition there had been a series of general convulsions over a period of 2 3 years.

The physical examination was practically negative and without the X ray a diagnosis

July 21, 1883, a cyclone passed over the northern portion of the town of Rochester destroying the lives of twenty two persons and injuring many others Dr William W Mayo was appointed by the City Council to take charge of a hospital improvised for the injured Assistance in nursing was rendered not only by townspeople but also by Sisters from the Convent of the Sisters of St Francis in Rochester The catastrophe not only demonstrated the need of a hospital in the town but also suggested to the Sisters the desirability of their providing one Some weeks later after the injured persons had been relieved and the temporary hospital closed Mother Alfred the Mother Superior of the Community, approached Dr Mayo with the proposition that they would erect a hospital provided he would take charge of it Accordingly in the spring of 1885 Dr Mayo purchased for the Sisters a tract of fourteen acres of land consisting of an orchard farm on the western edge of the town one mile from the post office After various delays a hospital of forty beds the original St Mary's was erected and equipped

Dr Mayo was indefatigable in his work Besides his regular town and country practice he had a large consulting practice He drove fine horses kept rigid office hours from 11 to 1 in the morning 1 30 to 3 in the afternoon and from 7 to 8 in the evening and only an important emergency was allowed to interfere with this routine Outside of their school hours he took with him on his rounds his two sons William and Charles They also assisted him as much as they could in the office and at postmortem examinations sometimes sitting on the table or standing on boxes to get a better view of what was being done When the boys were sixteen and twelve years of age respectively they assisted their father at operations Thus the father and two boys became a surgical family

Dr William Worrell Mayo was one of the founders of the Minnesota State Medical Society in 1868 and its president in 1873 In 1882 he organized the Olmsted County Medical Society and was a member of it during the remainder of his life He was a member of the American Medical Association for nearly fifty years He made numerous contributions to medical literature on various medical and surgical topics

Politically Dr Mayo was a liberal Democrat and though living in a Republican state and community he was elected Mayor of Rochester several times and twice State Senator He always took great interest in governmental affairs municipal state and national He loved to travel and when his sons gradually relieved him of the burden of his surgical practice he made two trips around the world the last one when he was 87 years of age On this trip he was absent seven months and so hale and hearty was he that no one questioned his being too old to take the trip alone

Dr William Worrell Mayo died in Rochester Minnesota March 6, 1911, following an illness which was the result of an accident

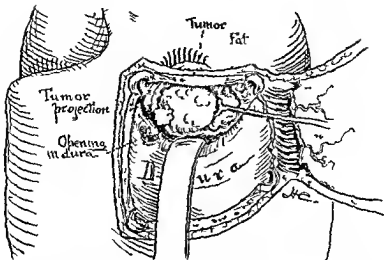


Fig. 4. Case 1. Sketch made subsequent to operation roughly to show the field with the exposed tumor and nodule which had penetrated the dura. (Reduced $\frac{1}{2}$.)

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and then raised his head and said I can hear it now. The patient's subjective observation of this extraordinary phenomenon was easily corroborated. The following note is quoted from his case record:

On lowering his head he hears (and one can hear with the stetho cope placed anywhere over the head) from three to four sharp metallic sounds like drops of mercury striking the bottom of a tin pan on raising and throwing back his head he hears these three or four sounds repeated. The impression is gained that there must be somewhere in the skull an hourglass shaped pocket containing fluid with bubbles of air which pass from one cavity to the other through a narrow neck. The patient locates the sound as being within the bony tumor with whose situation he is familiar from seeing the roentgenograms.

A series of X ray films were immediately taken which showed that the bubble of air was in the cerebral ventricle and shifted from the frontal to the occipital ventricular horn on change of position.

Final comment and end result. This most disconcerting happening completely unsettled my already wavering judgment about the advisability of operating. As matters stood the risk of an ultimate infection with meningitis could not be minimized. Nor was there any assurance that an operation could be undertaken without greatly increasing this risk. I had known of patients with a cerebrospinal rhinorrhœa which had persisted for years without serious consequences. I had never known of the combination of an orbital osteoma with a cerebrospinal rhinorrhœa and at the time looked upon the likelihood of curing either condition as improbable.

Under the circumstances and since the young man regarded himself as well and was about to be married there seemed to be no justification in urging immediate intervention. He consequently was allowed to return home with the understanding that he would report in the event of any further trouble. Three months later after spending an evening at the theater apparently in perfect health he awakened at 3.00 a.m. with a headache. This was followed by vomiting. At 10.30 he had a convulsion and a few hours later he died with a temperature of 106 degrees.

The experience with these two cases was enough to make me feel that the problem was certainly baffling if not surgically hopeless.

They were both young men in the prime of life and it is difficult to say whether I felt more disconsolate over and more responsible for the death I had provoked by an operation or for that which followed my surgical procrastination. That we still had much to learn regarding the underlying pathology of the lesions in question and their possible intracranial complications will be made evident by the story of the third case.

CASE 3. Surg. No. 24926. *Huge intracranial pneumatocele of unexplained origin exposed and emptied at operation. Recurrence of pneumatocele. Second operation revealing a minute pneumatocele alongside an orbito ethmoidal osteoma. Closure by fascial stamp. Reco ery.*

October 6 19. Admission of Mr. H. 41 years of age referred by Dr. R. J. Carpenter of North Adams, Massachusetts for advice concerning certain obscure cerebral symptoms and peculiar X ray findings.

History. He had always been vigorous and healthy. The only noteworthy incident was an automobile accident 5 years before admission in which he sustained a laceration of the frontal scalp. A cranial injury was not suspected; there were no disturbing sequelæ and the patient at least had no suspicion that this injury was in any way related to the symptoms which first put in their appearance 4 years or so later.

About a year before his admission he began having periodic left sided headache. Ever long he observed increasing awkwardness in the use of his right hand in such ordinarily simple acts as brushing his teeth or dealing cards. At the same time he began to experience considerable hesitancy in speech loss of memory and difficulty in calculating. These things were ascribed to nervousness from worry and he was sent abroad for 5 months. He returned improved but the symptoms reappeared as soon as he resumed his business tasks.

Physical examination. This revealed nothing more than a possible slowness of thought and of expression which to a stranger would not have been noticeable. His handwriting was quite legible but according to his statement he wrote only with concentration and undue effort. There was no evident loss of memory. He was alert and co-operative in every way. The subjective weakness in the right arm was not objectively demonstrable. The eye grounds fields of vision reflexes and all else were quite normal. But the cranial X ray films disclosed an amazing and unfamiliar picture. Dr. Sosman's report on them is as follows:

Left stereo of the skull (frontal piece) shows a vault of average thickness with a long sharply outlined clear area running backward along the left frontal bone about 13 centimeters in length and 5 centimeters in width. This has the density of air. The



Fig. 7 Case 2 Showing on lateral view the site of the former temporal operation and the dark shadow of the osteoma (nat size)

tion of air. Subjectively he was greatly improved and by the time of his discharge on December 15th he stated that his mental activity seemed more alert than it had been for at least 2 years.

Second comment with internal notes. Could it have been foreseen what was in store for us and had we felt certain of the bearing of the osteoma on the pneumatocele an immediate attack on the bony lesion with the purpose of closing the communication would have been the proper course. However I was not as yet convinced of their relationship. Certainly the pneumatocele if it actually was one which had been opened and drained by another surgeon in the preceding case contained both air and fluid and the subsequent X-ray films had shown the presence

of air in the ventricle. Here on the contrary was a perfectly dry pneumatocele and I could not understand how air could get from the nasal mases into the brain substance itself without at least crossing the meningeal spaces and setting up a rhinorrhoea. What is more I was fearful of establishing a rhinorrhoea where none existed. But let us continue with the patient's history.

On January 6, 1906, a month after his discharge he reported stating that his symptoms had completely disappeared and that he felt like his old self. The X-rays however showed (Fig. 15) a partial refilling of the cyst with air and apparently a fluid level.

On February 2 he returned again still feeling well. The X-rays showed (Fig. 16) a further increase in the amount of air the cavity having a multilocular

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By ALFRED J. BROWN, M.D., F.A.C.S., OMAHA

CONCERNING FRACTURE OF THE SKULL

By JACOB BERENGARIUS OF CARPI

METHODS of warfare have always greatly influenced surgery especially in early times when the surgical therapy practiced by the educated surgeon was confined principally to the relief of the results of trauma. Wars were very frequent during this period but these so called wars were little more than riots or uprisings of untrained mobs of hired ruffians armed with clubs, lances, or anything they could find. Following a successful attack and capture of a castle or town the soldiery immediately became unmanageable and the inhabitants were promptly either murdered or beaten badly and left where they lay to be buried if dead or cared for by the surgeons. The period ushered in by Lorenzo the Magnificent in Southern Italy was also signalized by the splendor of its entertainments. When one considers that in those days entertainment consisted largely in banquets and drinking to great excess the inference that broken heads were a common sequence is not difficult to draw. The opportunities therefore for study of injuries of the skull were great and Berengarius' treatise is the result of his intensive study of this department of Surgery.

Jacob Berengarius was born at Carpi probably during the third quarter of the fifteenth century. The son of a physician he was early inducted into medicine and became interested particularly in anatomy in which he followed the then authority Mundinus though he did much practical work himself for he says in the introduction to his anatomy that he had opened many hundred bodies. Also he was recognized by Gabriele Fallopius as the greatest anatomist up to the time of Vesalius. He pursued his early studies in Rome where he met and gained the patronage of Albertus Pius Count of Carpi. Desiring further knowledge in anatomy and surgery he went to Bologna and there obtained his doctor's degree. His continuous studies and successes in his work gave him a great reputation as a surgeon particularly in skull injuries for he was sent for from different parts of Italy to consult and operate on this type of case. When he operated upon Lorenzo de' Medici Duke of Urbino who had been injured at the storming of the castle of Mondolfo it seems that a piece of bone slipped between the skull and dura and he did not have the proper instrument with which to get it out but he goes on to

say Nevertheless the Grace of God aiding the bone was drawn out and health restored. Berengarius achieved the notice of many of the great men in Italy for he is mentioned by Vasari and Benvenuto Cellini and held in his part of Italy a position comparable to that of his contemporary John de Vigo who practiced in Rome. He was given the professorship at his alma mater at Bologna and this he held from 1502 to 1527. He then went to Ferrara and probably died shortly after 1530.

Though Berengarius was celebrated as an anatomist and also as one of the first to use mercury by injection in syphilis his major fame rests on his work in injuries of the skull. The treatise first appeared in 1518 carrying the title *Tractatus de fractura calvae sive cranii a Carpo* etc. and was reprinted at various intervals in amended and amplified form for nearly two centuries the last edition appearing in 1715. The edition illustrated is one of the most complete that of 1629 entitled *The Golden Book concerning Fractures of the Skull of the most Celebrated Jacobus Berengarius of Carpi* at one time Professor of Surgery in the Academy of Bologna. Hitherto desired. A new Edition freed from many errors. According to both title and preface the book was hard to get for the writer of the preface says— We give you benevolent reader this book of Jacobus Berengarius concerning fractures of the skull a work up to the present seldom seen but desired by many. As it had gone through three editions up to that time it must have been one of the most outstanding authorities to require reprinting over a hundred years after its first publication. Berengarius divides his work into two major parts the first the causes from which the names and types of fracture come. For example he enters into a discussion of the fracture by contrecoup. The second part treats of the symptoms prognosis and treatment of the different types of fracture and illustrates the instruments used and types of trephining. These parts run one into the other and at times both are discussed together so the divisions are not distinct. He refers to the great authors of antiquity and cites their opinions often with praise and always with respect. A little study of this book will only increase the reader's admiration for the amount of knowledge that Berengarius had been able to acquire.

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Fig. 2. Case 2. Patient 10 days after preliminary osteoplastic frontal exploration abandoned because of infected frontal sinus. Arrow points to site of drainage.

centimeters in diameter from which the involved bone and dura had been removed.

A cerebrospinal rhinorrhea seemed inevitable but on the mere chance of forestalling it a piece of fascia measuring about 5 by 3 centimeters was taken from the patient's anterior tibial region and laid over the widely opened sinuses a few fine sutures taken in the galea in front and in the margin of the dura behind served loosely to hold the graft in place. The whole frontal cavity was then filled with Ringer's fluid, the remaining portion of the bone flap was replaced and the scalp was sutured without a drain. There was not the slightest subsequent escape of fluid into the nose and the recovery was without any complication. The operation had been done under local anesthesia and the only postoperative precaution was to warn against blowing the nose or sneezing.

Had this so simple and effective a device to offset the dreaded complication of a cerebrospinal rhinorrhea been hit upon earlier the lives of the first two patients might have been saved. It was put to the test in the case of Mr. H. to whose secondary operation we may now return.

March 5, 1906. Relevation of former flap. Extradural exposure of orbital ethmoidal osteoma projecting through dura. Removal of intracranial projection of tumor. Disclosure of minute canal connecting ethmoid cells with the adherent leptomeninges whereby the pneumatocele could be inflated. Final implantation. Recovery.

Under local anesthesia the original osteoplastic flap was reelevated. A needle was inserted through the dura into the pneumatocele and 40 cubic centimeters of air was withdrawn, deflating the blown-up hemisphere. The frontal dura was separated from the roof of the orbit down to the situation of the intracranial projection of the osteoma which was surrounded by the same densely adherent collar of dura encountered in Case 1. Ether narcosis was resorted to at this stage because of pain caused by the manipulations of the adherent membrane. The dural collar was then freed by careful dissection with a sharp periosteal elevator. When so freed a defect about 1 cubic centimeter in diameter was left in the dura through which thickened and adherent pia arachnoid could be seen.

No sign of a communication with the nasal cavity could be made out until the projecting nubbins of the osteoma (Fig. 18) was chiseled off. To one side of it there was then disclosed a minute thread-like tube of mucous membrane about the size of a small arteriole. When the patient's nose was held during expiration a small bubble of air could be forced through the minute channel showing that it communicated with the underlying ethmoid cells.

A piece of fascia about 3 by 2 centimeters in size was then taken from the patient's leg and so placed over the orbital plate that when the frontal lobe was allowed to settle back into place it was interposed to the channel of communication. The bone flap was then replaced leaving air instead of solution to fill the empty extradural space due to the deflated and collapsed frontal lobe.

Postoperative notes. As after the first operation the patient was immediately aware of the restoration of his proper mental alertness, freedom of expression and normal movement of his previously awkward hand. The wound healed perfectly leaving as before a scarcely visible scar. An x-ray film exposed 10 days after the operation showed a small collection of residual air which had disappeared by April 14, 1906, when the patient was discharged.

At the present writing he has gone a year without any return of symptoms or x-ray evidence of reëlevation of the pneumatocele. A section of the intra-

themselves up into a nervous state which had a bad effect upon their hearing. It is acknowledged that the personality of the experimenter bulks largely in the treatment. The arguments for and against are fairly stated but leave one unconvinced in regard to the merits of the method.

That the organ of hearing can be re awakened in some cases of deafness the reviewer has no doubt. The results would appear to show that much of the gain has been in educating the central receptive mechanism to an increased acuity.

The book is very readable and the chapter on respiratory exercises after adenoid operation is worthy of thought. Dr Cathcart does well to insist that it is not sufficient to remove adenoids which bar the respiratory passage and directly or indirectly affect hearing. The respiratory mechanism must be re-educated. However the exercises he gives are very elaborate and might well be simplified.

J GORDON WILSON

THE third edition of Dr Mackenzie's book on heart affections¹ which summarizes his clinical experience is worthy of the high reputation of its author as a teacher and original thinker. It is not a comprehensive presentation of the subject of heart disease; rather it is a concise exposition of the more practical aspects of cardiology. The book is characterized by its common sense and will be of most value to the men who want helpful suggestions for daily practice. Subjects about which controversy centers are presented from the author's viewpoint with almost no reference to other authors or other theories. What is here contained obviously bears the stamp of a great personality, and is frankly presented as the result of a ripe experience.

The author has not found the various tests of cardiac function useful or even interesting. It is his opinion that the standard for estimating the heart's strength is found by ascertaining the response of the heart to effort. The standard by which the heart's strength is to be measured is not a fixed standard; it will vary with each individual examined. The field of normal response to effort varies widely in different healthy individuals.

The chapter on the original form of heart failure is a presentation of the views which have been associated with the name of the author for two decades or more. The pain of angina pectoris can best for practical purposes be considered as an expression of exhaustion of the heart muscle generally from insufficient blood supply.

It seems that the discussion of the cardiac irregularities would be more illuminating if these were illustrated by electrocardiograms instead of polygrams. The latter are more difficult to read and are certainly no better understood by American physicians. From the purely clinical side the discussion of auricular fibrillation is excellent. Theo-

retically, the author dismisses the theory of circus movement with the verdict not proven and still adheres to the view that the stimuli which during fibrillation of the auricle control the ventricle arise in the auriculoventricular node. The chapters on murmurs and diastolic murmurs are among the best in the book. The classification of murmurs as physiological functional and organic should help to remove much of the present confusion regarding the significance of murmurs. The physiological murmurs are defined as those which may be present in hearts which are perfectly healthy in every respect. From the physiological murmurs the functional murmurs must be separated the latter are found under conditions which imply some derangement of the cardiac muscle.

Apparently the authors accept the view that digitalis has an essential diuretic action other than that due to improved circulation: renal and general associated with the action of digitalis upon the heart. This is not in accord with current teaching.

The book is attractively printed and the subject matter well arranged. It can be highly recommended for its practical value especially to the general practitioner. It is informing concise and clear and should prove of real value to those who strive to apply the advances of modern cardiology in their daily practice.

JAMES G. CARR

JAMES G CARR

THE lectures² given on the invitation of the Universities of Barcelona and Madrid by the well known Italian physiologist Professor Giulio Fano have been collected and translated. The book is not a technical treatise on the physiology of the brain and heart but a broad philosophical speculative and artistic interpretation of the author's scientific data obtained through experiments on the physiology of the brain and heart. After discussing the relation of physiological data to living matter he arrives at the conclusion that there is no living matter but there are materials organized and utilized by the will to live. While discussing inhibition and will excitability and automatism he points out that physiology is not merely a natural science but is also a fount of moral instruction worthy of consideration and of imitation. The translation of Helen Ingleby is so excellent that none of the spirit of the original has been lost. Anyone interested in biology will find the book easy to read, interesting and stimulating.

A C In

THE subject of the surgical treatment of gastric and duodenal ulcer seems at the present time to be in a rather chaotic state. It reminds one of the controversy on the surgical treatment of gall bladder disease a decade or more ago. The question of cholecystectomy vs. cholecystostomy seems to be settled for the present. Now the great question is—shall a gastrectomy be done for chronic peptic ulcer?

B A I and H : L CROWE & P RY OLOG By C I F o
 T l ed by H l g l by f r eword by P I E H Start g
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Fig. 9. Case 1. Patient 10 days after preliminary osteoplastic frontal exploration abandoned because of infected frontal sinus. Arrow points to site of drainage.

centimeters in diameter from which the involved bone and dura had been removed.

A cerebrospinal rhinorrhoea seemed inevitable but on the mere chance of forestalling it a piece of fascia measuring about 5 by 3 centimeters was taken from the patient's anterior tibial region and laid over the widely opened sinuses a few fine sutures taken in the galea in front and in the margin of the dura behind served loosely to hold the graft in place. The whole frontal cavity was then filled with Ringer's fluid, the remaining portion of the bone flap was replaced and the scalp was sutured without a drain. There was not the slightest subsequent escape of fluid into the nose and the recovery was without any complication. The operation had been done under local anesthesia and the only postoperative precaution was to warn against blowing the nose or sneezing.

Had this so simple and effective a device to offset the dreaded complication of a cerebrospinal rhinorrhoea been hit upon earlier the lives of the first two patients might have been saved. It was put to the test in the case of Mr. H. to whose secondary operation we may now return.

March 25, 1906. Re-elevation of former flap. Extradural exposure of orbito-ethmoidal osteoma projecting through dura. Removal of intracranial projection of tumor. Disclosure of minute canal connecting ethmoid cells with the adherent leptomeninges whereby the pneumatocele could be inflated. Fascial implantation. Recovery.

Under local anesthesia the original osteoplastic flap was re-elevated. A needle was inserted through the dura into the pneumatocele and 40 cubic centimeters of air was withdrawn, deflating the blown-up hemisphere. The frontal dura was separated from the roof of the orbit down to the situation of the intracranial projection of the osteoma which was surrounded by the same densely adherent collar of dura encountered in Case 1. Ether narcosis was resorted to at this stage because of pain caused by the manipulations of the adherent membrane. The dural collar was then freed by careful dissection with a sharp periosteal elevator. When so freed a defect about 1 cubic centimeter in diameter was left in the dura through which thickened and adherent pia-arachnoid could be seen.

No sign of a communication with the nasal cavity could be made out until the projecting nubbin of the osteoma (Fig. 18) was chiseled off. To one side of it there was then disclosed a minute thread-like tube of mucous membrane about the size of a small arteriole. When the patient's nose was held during expiration a small bubble of air could be forced through the minute channel showing that it communicated with the underlying ethmoid cells.

A piece of fascia about 3 by 2 centimeters in size was then taken from the patient's leg and so placed over the orbital plate that when the frontal lobe was allowed to settle back into place it was interposed to the channel of communication. The bone flap was then replaced leaving air instead of salt solution to fill the empty extralural space due to the deflated and collapsed frontal lobe.

Postoperative notes. As after the first operation the patient was immediately aware of the restoration of his proper mental alertness, freedom of expression and normal movement of his previously awkward hand. The wound healed perfectly leaving as before a scarcely visible scar. An X-ray film exposed 10 days after the operation showed a small collection of residual air which had disappeared by April 14, 1906, when the patient was discharged.

At the present writing he has gone a year without any return of symptoms or X-ray evidence of reëlevation of the pneumatocele. A section of the intra-



Figs 12 and 13 Case 3 Patient 3 weeks after first operation to show situation and size of the osteoplastic flap

them resulting from injuries involving the mastoid cells. Dr W. E. Dandy in a more recent article¹ which appeared shortly after our experience with the case of Mr H. confined his attention to the intracranial collections of air for which he proposes the term pneumocephalus and of which he has gathered 25 cases. These lesions also are usually a consequence of fractures which pass through the paranasal air sinuses.

Though the etiological factors in the production of the pneumatocele of the frontal lobe in the first case in Dr Dandy's excellent report differed from those in the case of Mr H., the intracranial appearance of the cystic lesion must have been very similar in both. Mr Brodel's drawing indeed might well enough have served to illustrate the operative findings in both cases. Dr Dandy more over resorted to the same device though applied in a somewhat different way which I had also hit upon as an effective method of closing the dural defect—so simple a matter indeed that it would probably have occurred to any well trained surgeon in these days of fascial transplantation.

As in the famous case observed postmortem by Chiari (1884) the pneumatocele in Dr

Dandy's case had finally opened into the lateral ventricles a complication which had apparently occurred in Case 2 of the present report though without the preliminary formation of a large intracerebral air cyst. Mr H. fortunately had been spared this complication despite the long duration and large size of the lesion. Indeed in none of the reported cases had the condition been so slow so stable and provoked so few symptoms. What is more in none of them has the intracerebral pneumatocele been associated with an orbito-ethmoidal osteoma which after all is the primary subject of the present discussion.

With the experience of this man's recovery behind me I had gained sufficient confidence to operate promptly on the fourth case of the kind which ere long appeared in the clinic. The history follows:

CASE 4. Surg. No. 27976. *Orbito ethmoidal osteoma with intradural projection and intracerebral mucocele. Transfrontal osteoplastic craniotomy. Removal of tumor through roof of orbit with opening of ethmoidal cells. Fascial stamp. Uncomplicated recovery.*

January 10, 1917. Admission of Mr F., 35 years of age, a salesman, referred by Dr R. A. Finley of Dayton, Ohio, with the complaint of a painful unilateral exophthalmos, failing vision and scintillations.

Anamnesis. The past history is without incident or apparent bearing on his present trouble. He has no recollection of a cranial injury but has had

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EXPERIENCES WITH ORBITO ETHMOIDAL OSTEOMATA HAVING INTRACRANIAL COMPLICATIONS

WITH THE REPORT OF FOUR CASES¹

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Professor of Surgery Harvard Medical School

AS ONE who was admitted to this body twenty years ago under the guise of being a general surgeon I confessedly though unwittingly have fallen from grace. In consequence of this my appreciation of the compliment the association has paid me is all the greater. In 1880 when that remarkable person Samuel D. Gross took steps to found this society men of his large mold were not only able but were obliged to compass practically the whole of surgery. Since then the field has so widened as to encourage if not actually to force specialization upon us.

Even in those simpler days when this society was young every surgeon must have been conscious of the fact that as he progressed there were certain things which interested him more than others, certain lines of work in which he preferred to engage and in which he accumulated experience and skill above the ordinary. Had this not been so surgery would have remained stationary and we would be doing the same sort of things in the same sort of way as our predecessors. At the present day few of us can hope to make definite and permanent contributions to more than one small subject. As the surgical vista widens the scope of one's general work shrinks and consequently each of us in a fashion whether by force of accident or by

premeditation comes to particularize and to pioneer in his work.

Nevertheless there are not a few general surgeons who quite unconscious of their own pioneering look upon the convert to surgical specialization as a renegade from the guild. What are surgical specialists but those whose chief insignia is a headlight or a reflecting mirror wherewith to illuminate some orifice mentionable or otherwise within which they supposedly do their work? Specialization in such tasks might well enough be condoned were it not that the specialist taking advantage of his official introduction to surgery is too much inclined in the opinion of some to poach on adjacent territories quite out of his province. For should he yield to this temptation he will be certain to encounter problems which entice him but which from his insufficient training he is unfitted to attack. There may be some grounds for this criticism but no less deserving of criticism is the sort of all or none attitude still sometimes assumed by the general surgeon who is over ready to apply his scalpel to any organ or part of the body whatsoever.

There are as I see the matter two kinds of specialists—those who have had a general surgical training before they particularize in their work as most of us do sooner or later



Fig 18 Case 3. Photograph (nat size) of the intra-cranial portion of the osteoma which penetrated the dura

several bouts of otitis media (the last one in 1922) and also a succession of attacks of supposed infection of the right frontal sinus. The first of these occurred in 1910 and to the last of them he ascribes his present complaints. These began abruptly 3 months before admission (on October 4, 1916 to be exact) and came on in the course of a heavy cold which he had been having. The initial symptom was a sudden intense pain in the right orbit as though something were pushing against his eyeball. The acute pain subsided after a few days leaving a sensation of soreness in its wake. A week after the onset of these symptoms he had an attack of sciatica which was severe enough to confine him to bed and from which he has since suffered considerably though he has resumed his occupation. This sciatica was ascribed to an arthritis possibly secondary to a sinus infection. Consequently cranial X rays were taken which disclosed an opaque tumor nodule in the back of the right orbit. There has been some loss of visual acuity.

Physical examination. This apart from the purely local condition about the orbit was negative in all respects except for some right sided sciatic tenderness and a Kernig sign. There was possibly a slight exophthalmos with a little downward displacement of the eyeball but no pupillary or ocular motor change. Pressure against the right eyeball when compared with the other eye seemingly met with greater resistance. The right disc was hazy and the vessels were engorged. The visual field was unaffected but the acuity was reduced to 2/40. The cranial X rays showed (Figs 20 and 21) the shadow of an irregular bony tumor about 3 centimeters in length apparently arising from the roof of the right orbit and projecting both into the orbit and cranial chamber its center being about 2 centimeters from the mid line.

First comment. Here then was a young married wage earner the sole support of a family of four children who was harboring a small benign osteoma of the orbit which all things considered was producing trifling symptoms and did not seriously interfere with his work. Was an operation justifiable in view of the surgical disaster in the first case in which the circumstances were similar?

Was it better judgment to wait until some complication arose which would make it obvious to all that intervention was imperative whatever the risk? The responsibility of a decision under such circumstances is heavy as surgeons know perhaps better than others. During the 10 days he was under preliminary observation the visual acuity dropped from 20/40 to 20/100 and this fact helped to settle the matter in favor of intervention.

January 1, 1917. Osteoplastic exploration under novocain ether. Disclosure and removal of an orbito-ethmoidal osteoma capped by an intradural meningeal fascial implantation. Recovery.

Under novocain the usual right frontal osteoplastic flap was turned to the side and on elevating the dura from the roof of the orbit the circle of pachymeningeal attachment surrounding the neck of the intracranial projection of the osteoma was readily brought into view. As in the two other cases in which the tumor had been approached from above the intracranial nodule was exposed approximately at the depth of the posterior ethmoidal cells and lay possibly 2 centimeters from the mid line—a position in other words practically in correspondence with the orbito-ethmoidal suture. Though the collar of dura was dense and closely encircled the neck of the intradural projection of the lesion it was possible with a periosteal elevator to pry the membrane free and to strip the collar over the head of the bony nodule.

The hole in the dura was kept covered and was not investigated until later.

With a chisel the roof of the orbit was then opened and the bone chipped away up to the margins of the intracranial nodule already exposed (cf. Fig 4 in which conditions were very similar). Care was taken not to tear into Tenon's capsule and the orbital contents were retracted to the side. It was then possible gently to rock the tumor (Figs 22-25) out of its bed and to dislodge it. In so doing an irregular portion of the growth extending into the paranasal sinuses came away together with the adherent mucous membrane leaving a large opening into two of the ethmoidal cell. There was an immediate passage of air from the nose and some bleeding from the torn mucous membrane which was checked by a pledget of cotton wet with adrenalin solution.

Further investigation within the orbit showed that there was a thin scale of bone evidently the displaced outer wall of the ethmoid cell within which the main intra-orbital portion of the tumor had been pocketed. The scale of bone (Fig 25) was easily removed and the compressed orbital contents promptly expanded to fill in the cavity. On the basis of this finding the growth had originated on the nasal rather than the orbital side of the septum.

symptoms complained of. In addition there had been occasional periods of slight diplopia and the patient had observed that the eyeball had become harder as well as more prominent. A few weeks after the onset of symptoms he had been operated upon for a presumed ethmoiditis with negative findings. Aside from this he had received no treatment. He had been able to continue at work until shortly before his hospital admission.

His previous history had no apparent bearing on the condition except for the fact that he had received 5 years before a glancing blow over the right eye. This had left a small scar on the brow. He had once had his tonsils and adenoids removed and a mastoid operation had been performed some time before the onset of his present trouble. There was a chronic left otitis media with perforation.

Physical examination. This revealed little more than has been told. There was on the right side an appreciable but not obtrusive exophthalmos (Fig 1) with slightly dilated pupil. The globe was firm and unyielding to pressure. The fundus showed slight primary optic atrophy. A central scotoma was demonstrable vision being reduced to 4/200. There was in addition a relative right sided anosmia. The ethmoidal mucous membranes on the right side appeared injected but a careful examination after shrinkage with adrenalin revealed no anomalies. The lateral stereoscopic X-ray films disclosed (Fig 2) a poorly defined area of increased density in the posterior portion of the right orbit, the orbital plate appearing intact. The posterior films (Fig 3) showed clearly that this shadow extended into the region of the right ethmoidal region underlying the olfactory groove. The right frontal sinus was undeveloped.

Diagnosis. The roentgenologist ventured a diagnosis of sarcoma. Clinically an olfactory groove meningioma with secondary thickening of the subjacent bone was favored. An orbito ethmoidal osteoma was not suspected.

May 3 1914 Exploratory operation. The usual right frontal osteoplastic flap was reflected with the lower incision in line of the brow. The dura was elevated from the roof of the orbit back to its firm line of attachment along the sphenoidal ridge. There was no evidence of a meningioma but projecting through the dura from over the posterior ethmoidal region a small hard bony nodule was encountered. When the attached ring of dura had been freed from the neck of this nodule (cf Fig 4) there was an escape of cerebrospinal fluid. Realizing that the bulk of the tumor must lie within the orbit the roof was chipped away exposing Tenon's capsule through which the main tumor mass could then be palpated. The capsule was incised and when the orbital tissues had been brushed away to the right the upper surface of a dense bony tumor of irregular shape and cartilaginous smoothness was exposed.

The small nodule which projected into the cranial chamber was then separately broken away by



Fig 1 Case 1 Patient before operation showing the light exophthalmos of the right eye

rongeurs from the ethmoidal region. In doing so an adjacent mucocele was opened and a mass of tenacious gluey and supposedly sterile mucus escaped. No cultures were taken. The large nodule was then easily rocked free and lifted out of the orbit (Fig 5).

Before closing the wound a futile attempt was made to occlude the opened ethmoidal cells by coating the fatty orbital tissues to lie against them. After complete haemostasis the flap was replaced and the scalp sutured in the usual fashion without a drain.

First comment. Here was a case in which a lesion with which I was ill prepared to deal was unexpectedly encountered. The preoperative diagnosis of a meningioma of the olfactory groove (dural endothelioma) had been based on the combination of a unilateral anosmia and the bony shadow supposedly involving the inner orbital wall. Meningiomata arising from this situation are fairly common lesions. I confess however that it is the outer side of the orbit and wing of the sphenoid that is usually involved in the para orbital meningiomata associated with cranial hyperostoses¹ whereas here the

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g r a d d o t h e l i o m a s A r c h N 1 & P y h t o v 39-15



Fig 30 Case 4 Right lateral roent., no. 10, to show shadow of orbit ethmoidal ost. oma (nat size) indicated by arrow

Virchow's view which perhaps is good enough for most of us

In that classic of our medical literature 'Die Krankhaften Geschwülste', Virchow attributed to Cruveilhier the merit of having described under the name of 'corps osseux enkystes' certain of the bony enostoses which have characteristics distinguishing them from the exostoses. Cruveilhier had based his conclusions on the study of three furrowed irregular and warty bone tumors of the fronto-orbito-ethmoidal region so placed in the inside of the bones as to push out the inner table before them like a plate. And Virchow goes on to say

Although there is scarcely any part of the orbit where these bone tumors have not been found the upper and inner part however are by far the most frequent sites. There are the two regions which in relation to their original development show the greatest complication. On the one hand there are the frontal sinuses the development of which continues into a relatively late period of life. On the other hand the union of different bones to each other namely the frontal bone the maxillary bone the ethmoidal bone etc. is so complex that different disturbances during development can very easily occur. In addition there is the proximity of the nasal cavity and the tear ducts from which entirely distinct maladies can arise and spread to the neighborhood. It is therefore not only understandable how these regions often become the seat of disease but also how difficult it may subsequently be to determine whether a tumor has originated primarily in the nasal or frontal sinuses or in the



Fig. 3. Case 1. Postero-anterior view showing how indistinct may be the shadow (indicated by arrows) of a large orbito-ethmoidal osteoma.

Second comment. This was a very disheartening finale to what had promised to be a most favorable operation. Whether the mucocoele had been the source of the infection or whether the field of operation had been secondarily infected from the nose is now difficult to tell. It certainly would have been wise to have closed the opening in the dura in some way but it took further experience to make clear the necessity or possibility of doing so. To have left for a few days a gutter percha drain in the lower angle of the wound leading from the opened ethmoidal cells would probably have served the same purpose but the neurosurgeon's tendency is to close all craniotomy wounds securely and to avoid drainage if possible.

This lamentable experience was sufficiently disheartening to stay my hand in the next patient with an orbital osteoma that came under observation. My conservatism has never led to an equally disastrous outcome.

As a matter of fact we were not yet sufficiently familiar with these unusual lesions to know what a variety of complications they might provoke. The history follows.

CASE 2. Surg. No. 22445. *Orbito-ethmoidal osteoma with intracranial complications. Convulsions and recurrent orbital infections. Previous lateral craniotomy with drainage of infected(?) acrocele. Attempted exposure of tumor blocked by infected frontal sinus. Subsequent surgical procrastination. Vasal rhinorrhoea with ventricular pneumatocele. Death from meningitis 4 years after onset of symptoms.*

October 14, 1914. Admission of John W. C. aged 22 referred by Dr. H. H. Fox of Miami, Florida with the complaint of convulsions.

Anamnesis. He had previously enjoyed perfect health. Aside from a trauma of the mid frontal region received some 10 years previously which had left a small scar his antecedent history had no apparent bearing on his present trouble. In September of 1910 suddenly and without apparent cause the right eye and side of the face became painful, swollen and oedematous. There was some protrusion of the globe with diplopia. The ethmoid



Figs 22-25 Case 4. Showing (nat size) (1) anterior view of tumor together with inner wall of orbit (lamina papyracea) which had been pushed ahead of its intra orbital projection (2) inner surface of tumor (3) posterior surface of tumor and (4) lower surface of tumor. Arrows in Figures 22 and 23 indicate neck of intracranial protrusion.

Even if discovered one can hardly imagine such a lesion being preferentially attacked through the nose which may account for its not having aroused the interest of the rhinologist.

Hence the field has been left apparently to the ophthalmologist but the usual method of approach through the orbit favored by ophthalmic surgeons is an awkward one and they have usually contented themselves with chiseling off so far as possible the intra-orbital portion of the growth a procedure doubly difficult on account of the eburnated character of the lesion and its inaccessibility when approached from in front. It may some times be necessary according to Professor Fuchs even to enucleate the eye as a preliminary step. Neither method of approach whether by nasal or orbital route makes allowance for the possibility that the tumor may possibly have extended into the intracranial chamber.

These orbito ethmoidal osteomata are unquestionably rare or at least are rarely

recognized. In a comprehensive article on the subject in the days before Roentgen's discovery Joseph A Andrews¹ stated that in approximately 500,000 cases studied in the ophthalmological hospitals of New York only eight examples had been recorded. One

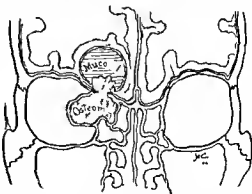


Fig 26 Case 4. Diagrammatic representation of situation of osteoma and its intracranial mucocoele.

¹ Andrews, J. A. S. et al. In: Two osteomata of the orbit. N. Y. Med. Rec. New York, 1897, vol. 31, p. 74.

would hardly have been possible. This corroborated the observation of the previous year namely in disclosing (Figs 7 and 8) 'in the region of the right olfactory groove extending laterally over the roof of the orbit and apparently down into the orbit a dense bony mass with smooth and distinct outlines suggesting an osteoma. The sinuses showed no involvement.

Though I was distinctly gun shy on account of the outcome of the operation in the preceding case nevertheless an exploration was advised and undertaken. The account follows.

October 28 1904. Right frontal osteoplastic craniotomy. Accidental opening of infected frontal sinus. Radical operation abandoned. Drainage of sinus.

In this procedure the usual frontal osteoplastic flap was made with the lower leg of the incision in the line of the brow. Ordinarily one has no great hesitation in these operations in cutting with the gill saw across the frontal sinus when it shows as in the case of this patient no roentgenological evidence of infection. However there was no especial reason of having the flap particularly low and it was my intent to avoid the well developed sinus. Nevertheless its tip was opened fortunately without injuring the mucous membrane. The dura was elevated from the orbit far enough to come down upon the dense meningeal attachment encircling the neck of the readily palpable osteoma which projected through the membrane into the cranial chamber.

At this juncture the mucous membrane over the small opening into the frontal sinus suddenly ruptured and purulent looking material escaped into the field. Though immediate smears showed no organisms fearing a possible infection from this source the major operation was abandoned. The anterior wall of the frontal sinus was then widely opened and the cavity found to be filled with infected polyps. These were cleaned out together with the mucous membrane and the minute fronto-nasal canal was dilated. The osteoplastic flap was then replaced the wound being closed in the usual two layers a small gutta percha drain having been left leading from the opened frontal sinus.

The major wound healed by the usual exact primary union the drain was removed on the third day and the small drainage canal promptly healed (Fig. 9). He was discharged on November 10th with the understanding that he would return in 2 weeks for the resumption of the operation. It was hoped that by then the conditions of the frontal sinus would have become quiescent.

Second comment. As I project myself again into the memories of this patient's case I am conscious of having been oversensitized by the outcome of the preceding experience



Fig. 5. Case 1. Showing the upper surface of the osteoma as removed (nat. size).

and to have shown a surgical white feather. The cultures from the supposedly infected sinus proved to be sterile. There was no discharge from the point of drainage which promptly closed and as subsequent events made it clear this would have been the time to have re-elevated the flap and to have completed the operation. I confessedly had not as yet the vaguest conception that these tumors might of themselves set up serious intracranial complications irrespective of any surgical intervention. Hind sight is always better than foresight and the surgical problem was a much simpler one than we then conceived it to be. To continue with the story.

After his return home on November 10 1904 he remained so free from symptoms that he felt disinclined to have anything more done. He had gone back to work become engaged to be married and it was not until January of 1905 that he re-entered the hospital for observation. There had been no more convulsions and he seemed to be in perfect condition.

However a most unexpected thing happened a day or two after his admission. He complained one day of having a slight cold with watery discharge from the nose when he stooped over. Inquiry elicited the fact that he had been intermittently subject to this sort of thing for the past 2 years or more. It had not occurred to him to mention it nor had the possibility of a rhinorrhoea been inquired into on his previous admission. He also stated that after these periods of running nose he was apt to feel a swishing sound on moving his head and sometimes heard a tinkling noise. He lowered

I m t whether th w l w c sec t po eeze
h t t may h bee in f h subseq t i t r h pok f th
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unseq dy i g t x th t nkl g so nd wh h w id lly be g
a h y

Whatever may be the surgical views of those who specialize in the disorders of the eye or nose in regard to these orbito ethmoidal osteomata the neurosurgeon would certainly prefer to get primarily to windward of the lesion before attacking it rather than to beat his uncertain way through the nose or the orbit not knowing what troubles will be in store for him with the tumor dislodged.

So in closing may I be allowed to return to the subject of my preamble. The lesion under consideration arises apparently from the ethmoid cells. It would supposedly therefore lie in the province of and be primarily detected by those who specialize in diseases of the nose and throat. As a matter of fact the secondary symptoms from intra orbital pressure send the patient as a rule primarily to the ophthalmologist who in the

past has courageously and often successfully attacked these lesions from in front with the removal at least of its intra orbital portion.

It is evident however that certain of these ethmoidal osteomata perhaps the majority of them ultimately lead to intracranial complications of one sort or another. They consequently may fall into the hands of those whose special training makes them more at home in the cranial chamber than in the orbit or recesses of the nasal air passages. So do our surgical specialties overlap. The only safeguard for the patient, as I see the matter is for all who engage in surgical specialization to have had a thorough preliminary grounding in the principles of general surgery for no one can possibly foretell into what difficulties or into what adjacent and unfamiliar territories his chosen specialty may lead him.

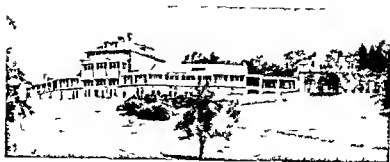


FIG. 1 The New England Peabody Home for Crippled Children, Newton Center, Massachusetts. The building is placed on the south side of a high hill and is constructed so that it lies in the path of the sun facing due south insuring the maximum of sunlight on all of the porches.

and is being attended by astounding results. Zinsser believes that the essential mechanism of resistance to the tubercle bacillus may be found in the activity of the cells making up the specific inflammatory reaction which is recognized as the tubercle. There may be here formed a substance of an enzyme-like nature certainly not identical with ordinary antibodies. It may be that the insolubility which is conferred on the tubercle bacillus by its waxy and lipoidal constituents necessitates the production of a mechanism basically different from that which underlies the resistance to other bacteria and it may be that the tissue mechanism around the tubercle is the part of the story which concerns resistance to the bacilli in their acid fast condition. Krause (6) points out from his experiments on animals with tuberculosis that there is a definite ability to fix the bacillus in the tissues. He regards this as a specific immune reaction produced only by infection with the tubercle bacillus and that it represents an allergy or allergic state. Animal or human individuals who are in this state of allergy have a favorable reaction to reinfection quickly checking the spread of the disease. This allergic state is reduced by fatigue, anaemia and other bacterial infections. It seems justifiable to assume therefore that any and all means at our disposal which may raise the individual resistance to tuberculosis are the means to be employed.

There is an abundance of clinical evidence that so called heliotherapy will raise the

resistance of the tuberculous patient especially in the localizations of the disease which are known as surgical tuberculosis. As has been suggested there is a widespread belief in the wonderful results which follow exposure to the sun. The reasons for this belief may be summarized in a review of observations made during the summer of 1926 at the clinics of Rollier in Leysin, Switzerland, Sir Henry Gauvain at Alton, W. Rowley Bristow at Pyrford and G. R. Girdlestone at Oxford, England and at the New England Peabody Home for Crippled Children in Newton, Massachusetts, U. S. A.

Rollier (7) has so frequently voiced his belief in the curative value of heliotherapy that repetition seems unnecessary. In his *La Cure du Soleil* (1915) his views are clearly stated and need no emphasis from others. In brief the impressions gained by a visit to his clinic are as follows:

Surgical tuberculosis is absolutely cured by heliotherapy.

The rays of the sun act most effectively at an altitude of three thousand to five thousand feet above sea level.

Artificial light is valuable but is not to be compared with the rays of the sun.

Climate has influence in that bracing fresh air is valuable.

The treatment to be most effectual demands an abundance of sunlight and exposure of the skin to the sun.

The exposure of the skin, the skin being made use of as an organ, is of the greatest

(adjacent cranial) bone is apparently involved as shown by serrations along the superior margin of this shadow. Elsewhere in the shadow there are different degrees of density (Fig. 11) possibly due to varying thickness of the bone. Most of the films show (Fig. 11) a dense shadow in the region of the left frontal sinus with no apparent connection between it and the large area of decreased density.

Interpretation. The findings may be due to a large cholesteatoma similar to that previously observed in the clinic. The lesion in the frontal sinus may be an osteoma.

First comment. Here then was a man whose symptoms and complaints were purely subjective. The only objective evidence of trouble lay in the X-ray findings. These showed a small orbito-ethmoidal osteoma which apparently had no bearing upon the surprising intracerebral lesion which was revealed. This cyst or whatever it might be had the translucency of air but otherwise so closely suggested the X-ray appearance of a huge cholesteatoma which had been previously encountered¹ in the clinic as to have been misleading. I personally favored an air cyst but the significance of the small osteoma which was thought to lie in the frontal air sinus was entirely disregarded and I had not the slightest idea that the problem before us had any bearing on the two cases which have already been described. There was no X-ray evidence of a fluid level in the cyst, shaking of the head caused no sensation of succussion, the patient had been no rhinorrhoea. An exploratory operation was advocated and its description follows.

November 1, 1915. Operation under nitrous oxide disclosing huge subcuticular pneumatocele. Replacement of air by fluid. Closure.

Uncertain of what the lesion might be, a large left frontal flap was outlined (Fig. 1). So soon as the primary cranial perforations disclosed normal dura my suspicions that we were not dealing with a diploetic cholesteatoma were confirmed. The flap consequently was turned down and the dura exposed. It was slightly tense and bulging but there was nothing to betray an underlying lesion. On incising and reflecting the membrane upward the entire upper half of the widely exposed hemisphere was found to be occupied by a yellowish comparatively nonvascular and bulging cortex. This area was sharply demarcated from the rest of



Fig. 6. Case 2. Patient before operation showing slight downward displacement of right eye with narrow palpebral cleft. Note scar of previous operation in right temporal region.

the brain which was firm and normally vascularized. The appearances were precisely those of a gliomatous cyst of unusual size covered by an excessively thin layer of cortex and pia arachnoid.

The cyst was punctured; there was a puff of air and its walls immediately collapsed, leaving an excavation of astonishing size. The thin walls of the cyst were then lifted and the opening enlarged so as to allow inspection of the cavity. It contained no fluid whatsoever and therefore had no communication with the ventricle. Its wall was perfectly smooth and composed of the naked white nervous tissue without any covering membrane of any sort. Anteriorly the cavity ran down into a sort of funnel corresponding with the pear-shaped shadow of the X-ray. I then surmised for the first time that the cyst might possibly have some connection with the orbital osteoma. I, however, did not feel justified in pressing an investigation of this possibility for the operation had been sufficiently prolonged. Consequently the cyst was refilled with Ringer's solution, the dura was resutured, the flap was replaced after as careful hemostasis as possible and the wound closed without drainage.

He made an excellent surgical recovery. Healing was perfect (Figs. 1 and 13). Postoperative X-rays taken on November 16th, November 31st and December 1st (Fig. 14) failed to show any reaccumula-

This has been registered
as a case of the parietal tempo-
rally rebr. 1501 ms. C. H. H. A. J. P. J. d. 11 m. 1 ft. 11 in. 1 lb. 1
Reg. d. 11 m. 1 ft. 11 in. 1 lb. 1
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Fig 5 Tuberculosis of the tarsus. In this instance there was extensive involvement of the tarsal bone proved tuberculous by guinea pig inoculation and tissue examination. With protection from weight bearing, voluntary use of the muscles of the leg, and heliotherapy, there has been steady and marked improvement of the tarsus.

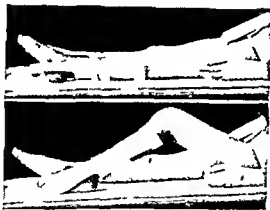


Fig 6 Tuberculosis of the knee. Light traction heliotherapy, voluntary use of the muscles, and return of 40 degrees of painless motion in the affected knee joint.

argument to be used. Surgical interference is dangerous at best and leads to disaster in most instances, except one—renal tuberculosis demands removal of the tuberculous kidney. Thus it is that for periods of time ranging from 2 to 10 years patients are treated by means of heliotherapy at Rollier's clinic. Interruptions in the treatment are dangerous. "Complete cure is finally accomplished. It is judged by the roentgenographic records. Indeed, the matter of resumption of function



Fig. 7 Tuberculosis of the hip with multiple infection, many sinuses, and amyloid degeneration. In this instance the child's resistance has not been raised by heliotherapy.



Fig 8 Lumbar Pott's disease with psoas abscess, multiple infection, amyloid degeneration, tuberculosis of the skull, and tuberculous peritonitis. In this instance heliotherapy would not raise the child's resistance.



Fig 9 Children with Pott's disease being treated by heliotherapy. The spine is held in hyperextension by a molded plaster jacket (Chormley type). The front half of the jacket is used when the back of the body is treated and the back half of the jacket when the anterior surface of the body is treated.

is decided by the roentgenologist who positively has no clinical knowledge of the progress of the individual. When the X-ray plate shows reconstruction of a joint or sufficient bloc about diseased vertebrae



Fig 8 Case 2 Anteroposterior view showing the osteoma (nat size) Note de section of septum

appearance. The air pocket showed a funnel which unmistakably pointed in the direction of the small osteoma. No fluid level was demonstrated.

On March 17 he reported again and a further increase in the size of the cyst was apparent (Fig 17) with the trabeculations more pronounced. Moreover his previous symptoms (headache, hesitant speech, subjective awkwardness of the right arm and even of the leg) had all returned. He was advised to re-enter the hospital for a secondary operation.

Third comment. Meanwhile experience from a case of another kind had taught us what to do. It was a desperate last minute resource in the case in question but a procedure so simple as a means of blocking a cerebrospinal rhinorrhoea of the usual spontaneous kind that I am chagrined not to have thought of it before. The case I refer to was one of those extensive meningiomata which

arise from the membranes of the anterior pole of the frontal lobe and which cause a tumor hyperplasia of the overlying bone with invasion of the frontal sinuses. In the course of the removal of the large growth together with its attached circle of dura not only had the anterior horn of the lateral ventricle been opened but it was necessary to rongeur away the lower part of the frontal bone almost to the glabella. In this process the upper portion of the large frontal sinuses had to be removed because of their involvement in the disease.

This extensive procedure had left a huge pocket in the frontal lobe into which ventricular fluid was escaping ready to pour into the gaping sinuses which freely communicated with the nasal cavity. There was nothing but scalp to cover the large area some 6



Fig 11 Tuberculosis of the lumbar spine. Roent enogram at left taken in 1924 shows involvement of the first, second and third lumbar bodies. Roentgenogram at right taken in 1926 shows fusion of these bodies with lessening of the deformity. Treated by heliotherapy.

the immense value of his contribution is justly considered.

In England the observer is at once struck with the fact that although surgical tuberculosis is there treated at sea level with comparatively little sunshine nevertheless the results of heliotherapy are as good as if not better than those seen in Switzerland at Rollier's clinics. This observation will I am sure demand substantiation and the most outstanding evidence is supplied by the work of Sir Henry Gauvain (3) at Alton. At this hospital one sees browned children whose bone and joint lesions are quiescent up and about with well nourished bodies having been transformed from pale suffering children with active progressive localized tuberculosis into children with lessened deformity and no evidence of active disease. Gauvain and his associates utilize all the sun that can be used and supplement the lack of sun with various

forms of artificial light i.e. carbon arc mercury vapor and Finsen Reyn lamps. The disease process is treated locally and the patient is treated as a whole by the rays from these various lamps. Added to this are rest proper surgical treatment in the way of protection and fixation carried out under the direction of Mr H. A. T. Fairbank good food fresh air sea water bathing and exceptionally healthful surroundings. The results are equally good if not a shade better than the results at Leysin. One feels that Sir Henry Gauvain is also an enthusiast and an optimist with a leaning toward the efficacy of artificial light in surgical tuberculosis. He however is modest in his optimism. He says 'With regard to the final results of treatment it is difficult at present to make any very valuable estimate as the results must be gauged by their permanency. Up to the present they have been quite satisfactory.'

cranial portion of the osteoma shows it to be a much more eburnated lesion than was that found in Case 1.

Final comment The accompanying sketch (Fig. 19) was made after the operation in an effort diagrammatically to represent the conditions which had been disclosed. It might well be asked why the intra orbital portion of the osteoma was not removed as well. This can be answered only by the admission of my own regrets on this score. I was still obsessed by the fear of establishing a cerebrospinal rhinorrhœa and wished at any cost to avoid the risk of widely opening the ethmoid cells. The growth moreover was small had never given any ocular symptoms, proves to be of the eburnated variety and may never give trouble. Should it do so it could easily enough be removed without hazard of meningitis now that the dural opening is closed.

What may have been the mechanics of production of this peculiar and extensive pneumatocele is difficult to say. One is inclined to ascribe it in some way to the frontal injury sustained 5 years before the onset of symptoms. This injury may possibly have produced a crack in the orbital plate or separation by diastasis of the orbito ethmoidal suture with a corresponding tear in the adherent dura. An air passage may thus have been formed without the escape (or any noticeable or remembered escape) of cerebrospinal fluid. The cerebrospinal spaces may finally have become blocked off by an inflammatory reaction leaving a small membranous canal through which air could be forced with the gradual production of the huge balloon shaped pneumatocele which the X ray disclosed 5 years later. A slight fracture involving the floor of the anterior cranial fossa must however be a very common happening whereas a pneumatocele is excessively rare and the combination of a pneumatocele with an osteoma as far as I am aware is unrecorded.

It was not until after the operative disclosures that inquiry was made of Mr. H. regarding periodic sneezing or blowing of his nose. He was unaware that his reactions were any different from those of other people.



FIG. 11. Case 3. Original postero anterior view showing the funnel shape of the cumulus like shadow in the left frontal lobe. The osteoma does not show in this film.

But a friend who overheard this inquiry and had been on a trip in the South with the patient during the interval between his two operations stated much to his companion's surprise that he had never known a man who blew his matutinal nose so violently or with such trumpeting. Doubtless air had been thereby forced through the minute canal directly into the brain substance in amounts which increasingly exceeded the absorptive capacity of the tissues. It is remarkable that the white matter of the brain lining the cavity of the cyst showed no evidence whatsoever of any inflammatory reaction and contained no fluid.

Extracranial air cysts commonly called pneumatoceles or aroceles which can be blown up and which communicate with one or another of the air containing sinuses at the base of the cranium are fairly well known. Important contributions to the subject have been made by two members of this society. Dr. L. L. McArthur¹ in 1903 reported a remarkable example of the extracranial form of pneumatocele and collected 32 cases from the literature. The majority of



FIG. 13. Tuberculosis of the spine treated by heliotherapy. Note the calcification of the psoas abscess. It has been found in many instances that psoas abscess treated by heliotherapy undergoes complete calcification. This indicates definitely that abscesses should not be interfered with surgically on account of the danger of multiple infection. In the presence of multiple infection calcification does not take place.

joint disease who do not respond to heliotherapy who develop abscesses have multiple infection amyloid degeneration and either die of tuberculosis or of some intercurrent infection. Perhaps I am fair at placing this group at about 5 per cent of our cases.

Heliotherapy in our hands is somewhat similar to that practiced at Leyden. We believe it to be made up of the following constituent factors: rest, good food, fresh air, surgical protection to diseased areas, happy surroundings, and light, both sunlight and artificial light. Added to this we have employed transfusion of blood with benefit in many instances. Heliotherapy, therefore, to our minds is a composite of many things which are aside from the light element, not in any

way connected with the sun's rays. This combined effect of many factors produces good results because by it the resistance of the individual to tuberculosis is raised to a point which represents a lessening of the power of the bacillus to invade new territory and a heightening of the power of the tissues to wall off and to fibrose the areas already occupied.

The end results of heliotherapy are as yet to be estimated. How much and how permanent healing takes place we do not know. Enthusiasm over what is now accomplished at institutions where these methods of treatment are carried out may lead to the belief that tuberculosis in its surgical manifestations is a conquered disease process. Disappoint-

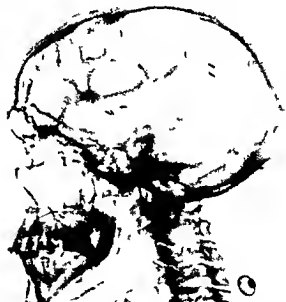


Fig. 14 (left, above) Case 3 Condition present on December 1, 1925, at the time of the patient's discharge 3 weeks after the first operation.

Fig. 15 (right above) Case 3 Beginning refilling of the cyst first observed on January 6, 1926, 2 months after the first operation.

Fig. 16 (left below) Case 3 Showing further and multilocular filling of cyst on February 2, 1926, 3 months after the first operation. No subjective symptoms appreciated.

Fig. 17 (right below) Case 3 Condition found on March 17, 1926, 4 months after the first operation. Symptoms beginning to return.



Fig 16 The majority of these children have resisted tuberculosis to the extent that they are up and about functionally using their bodies without active symptoms. They are as a rule strong well nourished and show the improvement which results from the use of heliotherapy—heliotherapy which represents a combination of many factors such as good food, fresh air, rest and protection, sunlight and artificial light.

inclined to believe that lack of clinical symptoms and signs of the disease may represent only a period of quiescence and that the ultimate healing of a tuberculous lesion re-

quires long periods of high resistance to the disease. The actual lesion of tuberculosis in the bone and joint structure will remain destructive in character and the amount of destruction will always remain variable depending upon the individual resistance. Heliotherapy and such are designed to raise the resistance. Surgery is applicable as an aid to the reparative process which heals the tuberculous lesion.

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During this stage of tumor enucleation the opening in the dura had been covered by the spatula used for the purpose of elevating the lobe (cf Fig 4). On withdrawing the spatula at this juncture a most surprising thing happened. Through the small opening there escaped a mass of stringy mucus and following it the capsule of a mucocele which must have been about the size of a hickory nut extruded itself. Cerebrospinal fluid then for the first time escaped from the dural opening. The approximate situation of the lesion and its complicating mucocele is shown in the sketch (Fig 26).

The ragged opening in the dura was not in a position where it could have been closed by sutures. Consequently a stamp of fascia was taken from the patient's leg and this was laid over the opened ethmoidal cells and the dura was allowed to fall back into position over it.

For a few hours there was some discharge of bloody cerebrospinal (?) fluid from the nares but the discharge soon ceased. The convalescence was without incident except for a temporary diplopia which disappeared in a few days. There was perfect wound healing (Figs 27 and 28). Normal vision was soon regained. The sciatic discomforts promptly subsided and when discharged on February 1, 1917 he was quite symptom free.

DISCUSSION

I have endeavored to present in their chronological order a series of experiences with a peculiar lesion—described herein as an orbito ethmoidal osteoma—with which until 3 years ago this present month of May, I was entirely unfamiliar. Since then four examples of the condition have come under observation. All four examples were in men three of whom had the scar of a frontal scalp wound received some years before. What is more three of the patients sought hospital care because of intracranial symptoms which were bizarre and seemed difficult to explain.

From lack of knowledge concerning the actual relation of the osteoma to the intracranial symptoms the first two of these patients succumbed. One died from infection due to failure to close-off the communication between meninges and nasal cavity at the conclusion of the operation the other died in consequence of surgical prostration. It is clear from what has subsequently been learned that both of these patients might have been saved by a comparatively easy operation safeguarded by a single maneuver.

Certainly in the future it will be far better immediately to operate upon and to remove

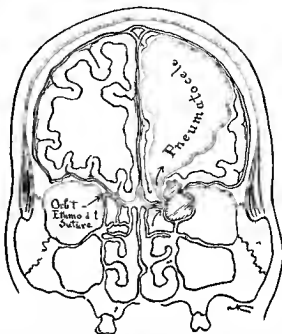


Fig 19. Case 3. Diagram to give the operator's impression of the site of the communication between the ethmoidal cell and the pneumatocele.

these ethmoidal osteomata so soon as they are picked up by the X ray. If they are neglected not only may the more familiar intra orbital complication arise but hitherto little understood intracranial ones. In this small series alone a cerebrospinal rhinorrhoea communicating with the cerebral ventricles, a huge intracerebral pneumatocele and an intradural mucocele have all been observed.

Whence may well be asked does the original tumor arise and what is the significance of its apparent relation to a preceding injury? Doubtless mild frontal injuries may more often than suspected produce a fissured fracture of the thin floor of the anterior cranial fossa or if not a fracture a diastasis of the suture between the orbital plate of the frontal bone and the adjacent edge of the ethmoid bone roofing the ethmoid cells. It was at this point of union that the intracranial projection of the tumor was found in all four of these cases and it is not inconceivable that some quiescent cartilaginous anlage may have been stimulated to bone production activity. This at least was

Pneumaturia, however may occur in other conditions (a) after instrumentation of the bladder (b) as a result of decomposing sugar in glycosuric conditions

In cases in which urine will readily pass from the bladder into the bowel the filling of the bladder with 12.5 per cent sodium iodide solution or some other fluid impervious to X rays followed by roentgenography, frequently gives very definite information. The best diagnostic evidence however is obtained when the site of the opening into the bladder can be determined and an opaque ureteral catheter passed along the tract of the fistula. In the case reported this procedure was done and after 60 cubic centimeters of a 12.5 per cent sodium iodide solution was injected through the ureteral catheter a roentgenogram revealed a complete outline of the bowel into which the communication was opening. By this means it is possible to determine not only the extent but in addition the particular section of bowel into which the fistulous tract runs.

PROGNOSIS

Owing to the frequency and inconvenience caused by the condition it is generally attended with anxiety, loss of sleep and depression. These lead to loss of weight and general exhaustion. The prognosis however must necessarily depend on the primary cause of the fistula. If this happens to be a malignant growth the prognosis is naturally very unfavorable. If the primary cause is purely traumatic or inflammatory the lesion is frequently amenable to surgical procedures and in some cases a spontaneous cure has resulted.

TREATMENT

The treatment is essentially surgical. Surgical procedures must depend on the nature of the primary pathological process causing the fistula and may be divided into curative and palliative.

In cases in which the fistula is the result of trauma or non tuberculous inflammation most gratifying results may be obtained but if the condition is due to a malignant or tuberculous process surgical procedures offer little hope of a cure.

The essential step is the obliteration of the fistulous tract and for this purpose abdominal section in most cases offers the best approach. If the communication exists low down in the rectum it may be reached by way of the perineum. Under these conditions it is generally possible only to separate the rectum from the bladder without closing the fistulous openings. In order to facilitate healing it is necessary to keep the bowels from moving for some days while at the same time the bladder should be drained by an indwelling catheter.

If the communication is higher than can be reached through the perineum the abdomen is opened and after the adherent intestine is separated from the bladder the fistulous openings in both bladder and intestine are closed or if necessary resected together with any fistulous tract which may exist.

Colostomy as a palliative measure was formerly extensively employed. In the event of a communication being definitely demonstrated distal to the point selected for colostomy this means of diverting the feces from the bladder may be employed. Spontaneous closure under these conditions has been recorded but the procedure is now almost confined to hopeless cases.

Suprapubic cystostomy is another palliative measure which is seldom used except when the condition is a result of advanced tuberculosis or malignancy.

The non operative treatment consists of measures likely to improve the general condition of the patient and minimize discomfort. In advanced tuberculosis or malignant disease this is all that can be done.

The diet should be regulated so that without any impairment of health there should be a minimum of residue. Bladder irrigations with the introduction of antiseptics are generally of value in all types of cases.

The following typical example of this condition recently came under our care.

Mrs. M. B. age 51 married admitted to hospital November 11, 1924. Patient has been ailing for last 6 months. She complains of passing with the urine together with a considerable amount of sediment. She has no pain no frequency and no hematuria. The menopause occurred 3 years ago. Her appetite is good and the bowels are normal and regular.

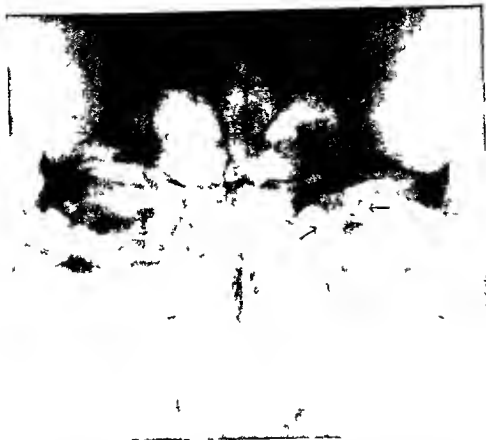


Fig 21 Case 4. Postero anterior roentgenogram (print reversed) showing situation of osteoma shadow indicated by arrows

orbital cavity whether it comes from the inner or outer surface of the bone finally whether it originates from the frontal or ethmoidal bone or some where else. For all of these possibilities there is evidence in the literature without its being always possible to determine the correctness of either opinion. For a tumor which arises from the interior of the frontal bone can very well later on project into the frontal orbital nasal or cranial cavity.

And from this general description Virchow proceeds to describe certain of the more famous cases in the early literature like those reported by Weiss by Rokitansky by Busch by Knapp by Baillie and by Iagel all of them being cases of ivory osteomata which had reached such a very large size as to make their primary origin indeterminable when they came to be studied after the patients' death.

Today fortunately the X ray comes to our aid and we may recognize these tumors before they have reached such a formidable size as those which Virchow described. If they all actually arise from the paranasal air sinuses as they seem to one would naturally expect that intranasal complications caused by the backing up of nasal secretions with the production of mucocoeles would be the primary incident to attract attention. Yet the rhinological literature is strangely silent in the matter and it would appear that intranasal inspection gives no clue to the diagnosis. Certainly no sign of the tumor was apparent on an intranasal examination in any of our four cases. In one of them indeed the ethmoid cells on the assumption that they were infected had been surgically explored without disclosing the osteoma.



FIGS 27-28 Case 4 Patient 12 days after operation showing inconspicuous scar and normal condition of eyes

would suppose that the number of recognized cases would have been greatly augmented by the introduction of the X ray. It nevertheless is unusual for roentgenologists to pick up these lesions in their pre symptomatic stage even in special hospitals for diseases of the eye ear nose and throat where one would expect them to be observed if anywhere.

Dr A S MacMillan the roentgenologist of the Massachusetts Eye and Ear Infirmary informs me that in the course of the last 7 years with the examination of upward of 15 000 sinuses he has occasionally seen symptomless pea like osteomata of the frontal sinus but has only known of one of the lesions in question. In this instance the diagnosis of osteosarcoma had been made from the roentgenograms and Dr D Crosby Greene approached the growth by removal of the lateral wall of the nose inner wall of the orbit inner half of the floor of the orbit anterior wall of the antrum and naso antral wall. This exposure according to Dr Greene's account brought to view 'a hard irregular bony tumor of the size of an egg which appeared to arise chiefly from the anterior surface of the sphenoid bone'. Evidently there was no intracranial com-

munication and the patient made an excellent recovery.

That four examples of these supposedly rare osteomata should have come so recently under observation in one clinic suggests that they may after all often be overlooked or go unrecorded. This is the more likely since these four cases all had an intradural projection of the lesion with secondary complications whereas the number of cases with out intracranial complications must be vastly greater.

How often the lesion may therefore have been overlooked in the past it is impossible to tell.

The writers of opthalmological textbooks warn their readers against the likelihood of setting up a meningitis when these tumors have been operated upon in the usual way. Certainly in the cases herein recorded if the osteoma had been approached through the orbit and rocked out of its bed it would have left a tear in the dura and a direct communication between the meningeal fluid spaces the nose and the orbit. From the past accounts of these operations in the literature thus cannot have been an uncommon happening.

TABLE II—THIRTY CASES OF PRIMARY CARCINOMA OF THE GALL BLADDER

Case	Sex	Age	Anam. & History	Clinical Findings	Ict.	Jaund.	Loss of weight	Pain	Diagnosis	St. f. d. t.	L. t. m. a.	D. t. f. l. f. b.
CASES OF MALIGNANCY GRADE 1												
1	F	66	Attacks of pain in right upper abdomen right costal margin tenderness and icterus lasting 3 or 4 days duration 30 years	Almost continuous for 2 weeks prior to examination	0	10	0	+	+	0		10 ¹
2	F	66	Lump in right upper abdomen for 4 or 5 years. A little painful and tender for 3 months prior to examination	Not stated	0	0	+	0	+	Deep lymph nodes		0
CASES OF MALIGNANCY GRADE 2												
3	M	56	Spells of pain for 7 years in epigastrium and left hypochondrium. In attack rolls on floor until morphine relieves	Severe griping to back	0	30	0	+	+	0		92.5
4	F	53	Attacks for 5 years of sudden epigastric pain running through back. Never jaundiced. Attacks last 3 hours	Sudden severe to back	0	0	0	+	+	0		85
5	F	52	Attacks of pain in right hypochondrium for 15 years. Residual soreness for 4 or 5 days	Sharp severe	0	0	0	+	+	0		79 ¹
6	M	60	Attacks for 5 years griping pain in upper abdomen and back. Almost continuous pain during last 6 days	Aching pain daily	0	0	0	+	+	0		45.5
7	F	52	Spells of pain in right hypochondrium running to right scapula recovers in 4 hours. Last attack 3 months ago. Jaundiced since	Sharp embarrases in position	+		0	+	+			44.5
8	F	63	Yearly attacks of pain below right costal margin for 6 years. Jaundiced clay colored stool gassy indigestion	Severe crampy	0	0	0	+	+	0		13 ¹
9	M	55	In last 3 years many spells of upper abdominal pain for 3 days. Jaundice. Frequent attacks in last 3 months	Colic like	0	20	0	+	0	0		12
10	M	63	Pyrosis and anorexia for 4 months. Attacks of pain in right epigastrium for 11 years. Jaundice followed spells	Severe colicky always radiates toward appendix	0	36	0	+	0	0		11
11	F	45	Spells of epigastric pain with jaundice for 7 to 10 days 6 years duration	Severe to right scapula	0	0	0	+	+	Lymph nodes		7.5
12	F	53	Several attacks in last 3 years of epigastric pain and vomiting malaise since last spell 3 weeks before admission	Very intense	0	0	0	+	+	0		6.5
13	M	60	Aching pain upper abdomen and back almost constant for 3 weeks. First attack of epigastric colic 8 months before admission	Discomfort dull ache	0	1	+	+	+	Lymph nodes periaxial		2
14	F	55	Pain beneath right costal margin at short intervals for 2 months. First attack 6 years before admission	Not recorded	0	3	0	+	0	Liver lymph nodes		0

Post mortem: histology test: my. D. grossed K. del. f. he. Liver. Weight: nut. 33. P. t. 11. g. Rec. r. r. n. c. i. 1. sup. f. cyst. d. et. pl. 3 y. ft. pe. t.

HELIOTHERAPY IN SURGICAL TUBERCULOSIS¹

By NATHANIEL ALLISON M.D. F.A.C.S. BOSTON, MASSACHUSETTS

THE use of sunlight in the treatment of disease is not a new thing. The use of the word "heliotherapy" in describing sun treatment however is new and about the use of this word many newly formed ideas and conclusions have clustered. The word "heliotherapy" has gained world wide usage and significance coming to mean to the minds of many the essential form of treatment in surgical tuberculosis. Indeed a mental picture is called up by the word "heliotherapy" which shows naked dark brown well nourished children extraordinarily active and happy playing about in the snow in the Alps—it is evident that the children have tuberculous lesions of the bones and joints. To those of us who are old enough to remember our hospital wards and out patient departments of 25 years ago a very different visualization is possible pale emaciated children with pinched faces increasing deformities abscesses amyloid degeneration general miliary tuberculosis meningitis and death. A striking contrast looking first on this picture and then on that. This remarkable change is due perhaps to many things but in its production so called heliotherapy beyond a doubt has played an important part.

In order to make reliable observations upon any form of treatment something must be known of the disease process under treatment especially of its cause and of the reaction of the human organism to that cause.

Surgical tuberculosis includes the manifestations of tuberculosis which by long established tradition have been regarded as surgical lesions that is lesions which are so localized as to be amenable to surgical treatment. Notable in this group are the bone and joint lesions kidney tuberculosis glandular and skin lesions eye infections and rarer forms.

Tuberculosis is a disease process due to invasion of the organism by the tubercle bacillus.

In the various forms of the disease which are called surgical tuberculosis the disease

process has become localized in some tissue and gives local evidence of its presence. For instance spinal column hip knee ankle—involving both bone tissue and joint structures. The process of localization is accomplished by the blood stream. The tubercle bacilli having gained a foothold in the glandular structures are carried to the bone marrow or synovia and take up activity at these points. This of course is well understood but nevertheless it is not generally realized that localized tuberculosis is only a sign of a general disease process.

The forward step which heliotherapy gave to the treatment of surgical tuberculosis depended entirely upon the realization that the local disease process is of secondary importance and that the treatment of a tuberculous individual is the matter of prime consideration. That this is true most of us can bear witness remembering as we do the time when a child with Pott's disease was treated with a brace or a plaster jacket when a tuberculous hip or knee was treated by braces and radical surgical procedures.

Tuberculosis is now recognized as a disease process which must be fought by raising the powers of resistance to the highest possible level in the infected individual. Granted that the virulence of the tubercle bacillus does not greatly vary shown by the experimental work of Eastwood and Griffith (2) and by Allen K. Krause (5) who says that the net result of many studies on virulence has been to emphasize all the more a fixity of bacillary type and potentialities more marked perhaps than for any other known bacterium then we must conclude that the variations in the disease process are due to a greater or lesser resistance in the individual. Zimser (8) has stated that all attempts at active immunization of man against tuberculosis have been entirely unsuccessful. Fortunately for the human race the problem is being attacked along sanitary and hygienic lines attention to nutrition personal and community life



Fig 7 Squamous cell epithelioma Grade 4 (Case 76)

average postoperative length of life was 34 months for the patients in Group A, and 4.8 months for the patients in Group B.

Detailed data on the clinical postoperative and pathological findings in the 30 cases of primary carcinoma of the gall bladder included in the present study are presented in Tables I and II.

The presence of jaundice extensive involvement of the liver, peritoneal grafting, ascites, and metastasis to the deep lymphatics have been considered contra indications to radical operation for cancer of the gall bladder. Moreover, when a biopsy shows carcinoma of Grade 3 or 4, radical operation seems inadvisable, especially in view of the end results obtained in the present series.

SUMMARY

The grade of malignancy in 30 cases of primary carcinoma of the gall bladder treated by cholecystectomy was studied to determine the existence of a relation between the length of life after operation and the grade of malignancy in the tumor removed. Twelve patients with carcinoma graded 2 or lower lived an average of 2 years and 10 months. Fourteen patients with carcinoma graded 3 or higher lived an average of only 4.8 months. Two patients with carcinoma graded 2 are living; one has remained in good health 6 years and 7 months and the other in fair health 1 year and 1 month. Of twelve tumors

graded 2 or lower, four were found at operation associated with gross or microscopic evidence of extension or metastasis. Of fourteen tumors graded 3 or higher, thirteen were found at operation to be associated with similar evidence of extension or metastasis.

In this group of cases the determination of the grade of malignancy through a study of the cell differentiation in a microscopic section of the tumor appeared to be a definite aid in estimating both the likelihood of metastasis and the relative length of the life of the patient after operation.

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Fig 2 Tuberculosis of the pinto dorsolumbar disease. A B and C show the type of exercise taken daily to strengthen the erector pinto group of muscles

importance The skin has powers of elimination circulation innervation and nutrition Where the skin is well browned and its capillaries are used to draw the blood from the deeper layers the muscles and joints regain their former tone and the lesions in the bone and joint structures heal Abscesses calcify and complete reconstruction takes place in time This healing process is aided greatly by functional use of the muscles Very soon after gradual exposure of the skin following a routine which exposes the lower extremities first pain and discomfort cease and healing sets in

The great disaster is multiple infection. Consequently abscess formation is everly let alone until the abscess content reaches the



Fig 3 Tuberculosis of the left knee and tuberculosis of the pinto With light traction and voluntary muscular exercise 45 degrees of painless motion has returned to the affected knee joint

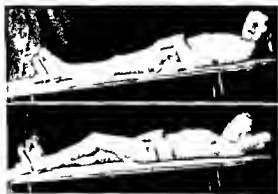


Fig 4 Tuberculosis of the hip In this instance both hips are tuberculous with discharging sinuses On entrance no motion was allowed in either hip and it seems that an kylos had been established With light traction and voluntary muscular exercise painless motion has returned to the affected hip joints

subcuticular region Then and not until then the abscess may be aspirated

The great catastrophe of surgical tuberculosis is surgical interference both in adults and in children Rest with the patient exposed in the sunlight is the necessary treatment The length of time required for cure is not an



- ☐ Extent of growth on lesser wall
☐ Extension of growth on posterior wall
☒ Gland involved
☐ Gland not involved

Fig. 1



Fig. 2

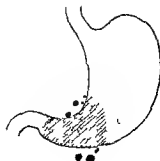


Fig. 3



Fig. 4



Fig. 5



Fig. 6

Fig. 1 The patient was a man aged 34. Symptoms had commenced 3 years before. The growth was of the ulcerative type and measured 8 by 3 centimeters. The operation performed was a Pólya.

Fig. 2 The patient was a man aged 60. Symptoms had commenced 6 months before. The growth was a carcinoma of the fundic type and measured 1 by 10 centimeters. The operation performed was a Pólya.

Fig. 3 The patient was a woman aged 31. Symptoms had commenced 6 months before. The growth was a carcinoma of the fundic type and measured 14 by 10 centimeters. The operation performed was a Billroth II.

Fig. 4 The patient was a man aged 65. The symptoms had commenced 1 year before. The growth was of the fundic type and measured 7 by 5 centimeters. The operation performed was a Billroth II.

Fig. 5 The patient was a man aged 62. Symptoms had commenced 4 weeks before. The carcinoma was of the ulcerative type and measured 4 by 3 centimeters. The operation performed was a Pólya.

Fig. 6 The patient was a man aged 61. Symptoms had commenced 4 months before. The carcinoma was of

the fungoid type and annular. It measured 7 centimeters in diameter. The operation performed was a Pólya.

Fig. 7 The patient was a woman aged 47. Symptoms had commenced 3 years before. The carcinoma was of the fungoid type and measured 4 by 3 centimeters. The operation performed was a Pólya.

Fig. 8 The patient was a man aged 45. Symptoms had commenced 8 months before. The carcinoma was of the ulcerative type and measured 7 by 5 centimeters. The operation performed was a Billroth II.

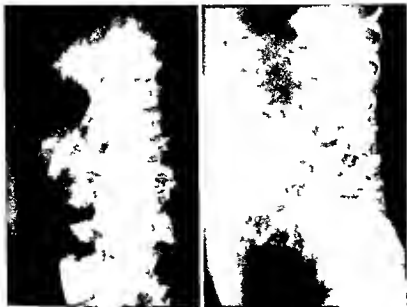


Fig. 10. Lumbar Pott's disease. Roentgenogram at left taken in 1924 shows involvement of the second, third and fourth lumbar vertebrae. Roentgenogram on the right taken in 1926 shows fusion of the bodies of these vertebrae with lessening of deformity. Treated with heliotherapy.

then it is decided that the patient may be up and about. Recumbent patients use their muscles and move the diseased joints as much or as little as they wish. Spinal disease is treated by recumbency without braces or jackets. Hyperextension of the spine is actively encouraged so that the erector spinae muscles become well developed and strong. During convalescence the apparatus used for protection is of the lightest type possible—celluloid or biven splints only.

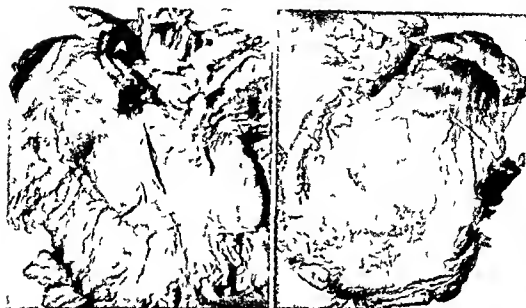
Without entering upon a discussion of the various effects of the sun's rays, their photochemical power or their bactericidal possibilities suffice it to say that Rollier believes the greatest good comes from this source. He believes that tuberculosis of the bones and joints is cured by this agency acting on the skin and that this form of treatment is that which should be given to all cases of tuberculosis in its so-called surgical manifestations.

Much credit is due Rollier for his admirable contribution to the cure of surgical tuberculosis.

Observations made last summer incline the writer to believe that the diagnosis of tuber-

culosis is correct in the vast majority of Rollier's cases; that what he claims for the sun's rays is in part true; that the situation of his clinic in the high Alps with clear bracing and stimulating air coupled with rest exposure to air and good food have much to do with the admirable results very evident at this clinic. Unfortunately there is no record of failure or of lack of improvement and this I wish especially to stress. There is always the possibility that unfavorable results are due to causes beyond control meaning by this that a case which has not improved under his treatment owes this to multiple infection to surgical interference or to poor cooperation.

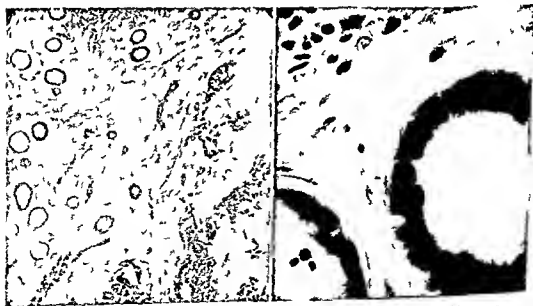
One feels that Rollier believes that heliotherapy is not to be blamed for an occasional failure. It may be said that in Rollier we have an enthusiast who realizes from his own extensive experience that surgical tuberculosis is much improved and at times cured by the methods of treatment he uses and which he calls heliotherapy. His optimism and wholehearted enthusiasm for heliotherapy are both understandable and pardonable when



Figs 10 and 11 Advanced carcinomatous involvement of a lymph node

The growths were classified as to type into four groups: ulcerative carcinoma, fungoid carcinoma, diffuse scirrhous carcinoma of the linitis plastica type, and a small group of

carcinomatous ulcers. Fifty-six per cent of the growths were of the ulcerative type, 33 per cent fungoid, 4 per cent of the linitis type, and 5 per cent carcinomatous ulcers.



Figs 12 and 13 Involvement of the subserous network. Figure 12 high power. Figure 13 oil immersion.



FIG. 12 Tuberculosis of the eleventh and twelfth vertebrae. Roentgenogram at left taken in 1923. Roentgenogram at right taken in 1926 shows fusion of the bodies of the diseased vertebrae. Treated by heliotherapy.

Another thing one observes at Alton is the earnest attempt to discover by blood examination and careful physical records what changes are taking place in the individual under treatment. Judged by the results of treatment one feels that Gauvain and his associates are justified in their optimism and enthusiasm. They deserve the great credit of demonstrating that surgical tuberculosis may be successfully treated at sea level in a country with limited sunlight as well as in higher altitudes with plenty of sun. This in itself is a contribution to the subject of the first magnitude.

At Pyrford in England W. Rowley Bristow (1) also demonstrates the truth of this as does Girdlestone at Oxford.

In England the attitude of those interested is well put by Girdlestone as follows. A tuberculous focus in a bone or a joint is obviously part of a deep rooted disease serious in itself crippling if there is delay disastrous if there is neglect. Modern treatment means the use of rest food and weather which if started in good time and kept up long enough will almost always bring about a cure. Modern treatment necessitates a special open

air hospital and a staff experienced and technically expert. There is no need of sending patients to distant hospitals."

Our own experience at the New England Peabody Home for Crippled Children has demonstrated to us at least that so called heliotherapy is essential to the proper treatment of surgical tuberculosis. At this hospital beautifully situated in the open country every possible advantage is taken of sunlight. In the environs of Boston at sea level with much cold wind and snow in winter and a heavy annual rainfall the Weather Bureau tells us that we have a yearly average of 57 per cent sunshine that during November December and January it falls to 48 per cent and that June to October shows about 63 per cent of sunshine. Ghormley (4) has shown by weight charts that the weight of the patients increases most in the months with the higher percentage of sunshine and we note without doubt a slowing up in the winter of each individual's resistance. However, it is clear to our minds that heliotherapy is successfully carried out indeed that our results run exactly parallel to those of Rollier, and those in England.

To be more specific We have noted that our cases of spinal tuberculosis as reported by Ghormley show the following success in improving deformity depends upon the regional localization and upon the extent and duration of the disease. For instance cervico dorsal no improvement upper dorsal 30 per cent improved mid dorsal 50 per cent improved low dorsal and dorsolumbar 66 per cent improved lumbar 90 per cent improved. The extent of the disease has much to do with this practically complete correction of deformity is possible where only two adjacent vertebral bodies are diseased.

Hips and knees have healed to the extent of allowing weight bearing function and with no active symptoms.

Tarsal involvement has uniformly responded by marked improvement.

Spina rentosa finally heals with little disturbance of function and surprisingly little deformity.

On the other side of the page however we encounter patients with tuberculous bone and

CHRONIC RHINOPHARYNGEAL DISEASE¹

BY BURT R. SHUKLY, MD FACS DETROIT MICHIGAN

A CONSIDERATION or discussion of chronic rhinopharyngeal disease must be limited necessarily to one of its scientific phases under the various classifications so voluminously outlined in our special literature namely nasal obstruction. It is not my purpose to burden you with a paper involving highly specialized surgical technique but rather to discuss some of the practical problems we meet in a long and constant daily contact with the various manifestations of chronic nose and throat disease.

In the school of experience we lay aside the ultraradical or ultraconservative methods of treatment for those of tried value. While the success of our results must largely depend upon diagnosis, operative skill and technique and after care too much attention can hardly be given to the psychological phase of our subject.

The diagnosis of all chronic rhinopharyngeal disease from the standpoint of the patient is either catarrh, tonsillitis, chronic cold, or among the more intelligent sinus trouble. A vastly increasing number of people in these days elect their specialist upon a self-satisfied classification of their disease. It would seem to me therefore of considerable importance that in a scientific determination of our own successful diagnosis and treatment an analysis of our patient's mental attitude should be given a more searching study. It is not infrequent to find imaginary or hysterical states greatly accentuated in our special field. As the number of referred cases decreases with the higher education of the masses who select their own specialists the danger of overlooking the essential etiology increases and the interrelationship of ophthalmology and otolaryngology and internal medicine becomes more and more important.

If our specialty is to meet successfully the problems of chronic rhinopharyngeal disease we must broaden our interest and knowledge to include borderline problems. Pathological processes have never held to strictly arbitrary

lines. Underneath our problems we find the ever operating laws of immunity. The virulence of the micro organism and the resistance to infection often determine our results. With the laws of immunity we must constantly study the role of the endocrines and the supply of vitamins. The research laboratory is solving biochemical problems with the prophecy of modifying and eliminating some of the present day principles and practices of nose and throat surgery.

The relationship of the eye to the nose has been recognized for many years. The contiguity of structure, the venous route and the lymphatics make the relationship interdependent. The important interrelationship of nasal disease, anatomical anomalies and sinus infection have been most forcibly demonstrated by the studies of Loeb, Oudin, Stucky, DeSchuenitz and others. Neoretinitis, papillitis, choked disk, optic atrophy and exophthalmos together with systemic infection passed over as neurasthenia, rheumatism of low grade and septicæmia require a careful investigation for suppuration and pressure in the sphenoidal cells or the ethmoidal labyrinth. While these old facts are well known the pathology is often overlooked. Pressure against the antral or septal walls may be relieved by removal of the offending middle turbinate.

Where these elementary surgical principles and a standardized choice of technique are thoroughly understood and applied the relief of chronic rhinopharyngeal disease must ultimately depend upon deeper research study that will deal with the prophylactic measures that afford better immunity and cell growth in the individual. The rapid transportation of septic or chemical material through the net work of the lymphatics to the cerebrospinal system can scarcely be realized until we perform the experiment of Cushing and inject 3 grains of urotropin into the rectum. In 1½ to 3 minutes spinal and ventricular punctures will contain this chemical substance. Infection must then be considered and measured



Fig. 14. Tuberculosis of the hip. Roentgenogram at left taken in 1914 shows diffuse inflammation of the head of the femur and the acetabulum. Roentgenogram at right taken in 1916 after 2 years of heliotherapy shows marked improvement in the character of the bone structure as evidenced by the roentgenogram.

ment it seems will surely be the result of this belief. At present surgery has a definite part to play in the cure of tuberculosis. We know enough of the healing process in the tissues to realize that bone and joint destruction is the typical lesion of this disease. We know also that the healing of the lesions requires the filling in of the destroyed areas by fibrous tissue, also that joint cartilages once destroyed are not in any sense regenerated and that ankylosis in good position is a fortunate result in many instances. Operations designed to assist nature in this healing are useful and result frequently in apparent cure with lessened periods of invalidism.

An inconclusive argument may arise as to the value of the time element in the cure of tuberculosis. I am one of those who hold that in children with bone and joint tuberculosis the time element may be largely disregarded. On the contrary, in adults and young adults I believe the time element is of great significance especially when ultimate cure implies the final ankylosis of a joint. In these statements I differ widely from the beliefs of the heliotherapeutic enthusiast because I do not believe that extensively diseased joint areas may be reconstructed—a term of Rollier—by the sun cure. I will gladly believe that in children taken early in the disease joints may

be saved to useful function—this is a consummation much to be desired. Consequently I believe that operative surgery is not indicated in tuberculosis of the bones and joints until methods of heliotherapy have been employed for long periods of time.

The differences which arise in the discussion of this problem have origin in our fundamental point of view regarding tuberculosis. If one has knowledge of the possible duration of this disease process in the tissues especially in such tissues as bones and joints he will be

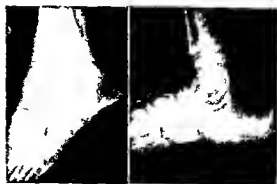


Fig. 1. Tuberculosis of the tarsus. Roentgenogram at left taken in August 1915 shows marked destruction in the neck of the talus and scaphoid with involvement of the os calcis. Roentgenogram at right taken in July 1916 shows marked improvement. This type of improvement called by Rollier joint reconstruction.

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ENTEROVESICAL FISTULA

By R. GORDON CRAIG M.B. Ch.M. F.A.C.S. AND R. K. LEE-BROWN M.D. Ch.M. SYDNEY AUSTRALIA
From the Department of Urology Royal Prince Alfred Hospital Sydney N.S.W.

THE comparative rarity of fistulous communications between the bladder and some portion of the intestinal tract seems to justify a review of this condition. The part of the bowel most commonly affected is the terminal portion of the large intestine and the communication is generally found between it and the base or posterior vesical wall. This is doubtless due to the close proximity of the sigmoid rectum and bladder. Though a communication between the rectum and posterior wall of the bladder is the commonest site of enterovesical fistula the condition is by no means confined to these two localities.

Pascal in a very comprehensive survey of this subject collected 195 cases and in this series the communication extended from the bladder to the following: 113 to rectum 4 to colon 26 to ileum 6 to caecum 1 to caecum and appendix 7 to appendix.

SEX

Cunningham in a series of 342 cases reports 75 per cent females and 25 per cent males.

ETIOLOGY

The condition may be subdivided into two classes: (a) traumatic and (b) non traumatic. The traumatic variety may originate from a wound or accident following which a vesico-intestinal fistula is developed or it may arise as a result of surgical procedures. The non traumatic variety may be subdivided into (a) inflammatory (b) tuberculous (c) syphilitic (d) actinomycotic (e) echinococcal (f) amoebic and (g) malignant. The inflammatory may be due to (a) abscess (b) diverticulitis or diverticulum (c) stone (d) stricture and (e) ulcer.

SYMPTOMS

The condition is accompanied by definite and distressing symptoms comprising (a)

gas per urethram (b) faeces per urethram and (c) urine per rectum. These are generally coupled with frequency and cystitis due to the continuous introduction of faeces and organisms from the bowel. The fistula is sometimes so constituted that only a one way flow is obtained. As for instance, in the case reported while faeces passed from the sigmoid into the bladder there seemed to be little evidence that urine passed from the bladder to the sigmoid the bowel action always being normal as also was the capacity of the bladder.

PATHOLOGY

The lesions most frequently giving rise to enterovesical fistula result from intestinal diseases. The primary cause of such a condition is not often found in the bladder and when originating from this site is generally the result of trauma malignant growths or vesical tuberculosis.

Bryan in a series of 42 cases gives the following primary causes of the condition:

	C
Sigmoid diverticulitis	15
Probable sigmoid diverticulitis	6
Inflammation	4
Surgical trauma	3
Carcinoma of sigmoid	3
Carcinoma of bladder	2
Carcinoma (not specified)	2
Ovarian abscess	2
Amoebic sigmoiditis	1
Carcinoma or gumma of sigmoid	1
Tuberculosis	1
Stricture	1
Ulceration	1

DIAGNOSIS

When air and faecal matter escape with the passage of urine there can be no doubt that a communication exists somewhere between the bladder and some portion of the intestinal tract.

although the percentage of remnants of such tissue is 1 to 5 per cent at least especially if the LaFore adenotome alone is used for that operation

Many children of the lymphoid type those with lowered resistance to infection, those with cervical adenitis not relieved by operation for sinuses and nasal obstruction those with recurring otitis media and so called respiratory catarrh, will respond surprisingly to nature's remedy that all the tissues call for and is almost as plentiful as the air—namely a simple household receipt made in the kitchen the components plucked from the garden 2 potatoe, 2 carrots 2 beets 2 tomatoes, and a bunch of celery squeezed through a meat press strained and placed in the refrigerator and served a wine glass full with salt and pepper and flavoring with each meal

This preparation of the salts of mother earth that belong in the blood has been used in my work for 30 years with great success and the biochemist now tells us that this prescription contains a wealth of vitamins. Alternated with cod liver oil or red bone marrow the genuine value of these foods is very great in postoperative otolaryngological surgery

In our endeavor to relieve chronic rhinopharyngitis and establish standards of treatment it is interesting to go underneath our strictly surgical procedure and remember that chronic hypertrophic rhinitis for example and like pathology is influenced in its development from the fact that man is now an artificial animal Under the laws of conservation why are the nasal passages with their great importance to the preservation of health so frequently marked by deformation and hypertrophies? Is it not true that many of our surgical problems are fundamentally present on account of etiological factors that are evolutionary and devolutionary through many generations and ages? The head of the Caucasian varies at the present time decidedly from that of centuries ago The anthropologists tell us that the relative proportion of the face and calvarium has undergone slowly through the ages certain changes until now the facial parts of our race are diminutive and compressed as compared with other parts of the body

The fact of this change to artificiality is of course greatly reinforced by the relatively increased difficulty of parturition It would seem logical to believe that prenatal as well as postnatal processes are at work in the increasing necessity for surgical work in the nasal passages It has been stated that more than 80 per cent bear the mark of an asymmetrical or abnormal developmental condition in the upper respiratory regions Under these laws and those of heredity we are called on to meet a progressive change in respect to the osseous framework of the face This departure from the aboriginal type furnishes an increasing tendency to the hypertrophies of early life

Neglected sinus infection has for many years been a constant source of chronic rhinopharyngitis but my experience on our examining board leads me to believe that the splendid instruction and excellent knowledge of our younger men will rapidly dispel any criticism along this line The detection of sinus disease in infancy and childhood due to the investigation of Dean and others is rapidly diminishing the neglect of this etiological factor Our modern laboratory methods are extremely efficient in uncovering the syphilitic taint as a factor A better control of our nutritional problems in infancy is counteracting the lack of structural integrity that artificiality imposes

As life advances pathological conditions should decrease influenced by the wonderful discoveries in immunization against the exanthemata It is also not surprising that these delicate mucous membranes with their highly vascular and neural supply and the limited space in which they operate and develop should be influenced by climatic change

Since it is the function of the turbinate bodies to become vascular and swell in order to protect the lower air passages from very cold air by the radiation of heat to the incoming current of air and mechanically lining the lumen for the passage of the same too much importance cannot be laid on the bad effects of exposure of the nasal passages to sudden extremes of cold heat and variations in moisture

It is the common custom in our climate to subject this delicate mechanism to radical changes of dry heat at 80 degrees F to 40 or



Fig. 1. Plain roentgenogram showing opaque catheters passing through the fistulous opening in the bladder into the sigmoid and from thence up the descending colon.

She complained of attacks of abdominal pain 8 to 10 years previously which were suggestive of appendiceal origin and on one occasion she was ill for 3 weeks with inflammation of the bowels. Physical examination was negative. The urine (not centrifuged) showed pus 25 to 30 (H D) occasional red blood cell (H D) epithelial cells 1 to 2 (H D) organisms rods casts none (H D) crystals oxalates albumin none sugar none.

Cystoscopy November 19 1924 under cocaine anesthesia showed in the bladder walls clumps of mucopus adhering to the mucosa at various points. There was early trabeculation with early cellulose formation. The interureteric ridge was elevated with ureteral orifices difficult to locate. Both ureters were catheterized to pelvis without obstruction. Specimens were collected. Plain X rays were negative. Bilateral pyelograms showed no abnormality of pelvis. Kidney urines were negative.

Sigmoidoscopic examination failed to demonstrate any communication with the bladder.

November 4 1925 cystoscopy showed about half an inch behind the right ureteral orifice a small opening into which two opaque ureteral catheters were passed without difficulty. Plain X rays were taken with catheters in position (Fig 1). Sixty cubic centimeters of sodium iodide solution (12.5 per cent) were injected through the catheters and an exposure made. Immediately following the introduction of the iodine the patient had an urgent desire to relieve the bowel and passed a watery motion.

The X ray revealed the catheters coiled up in the large bowel. The iodine completely outlined the bowel in the vicinity (Fig 2).



Fig. 2. Roentgenogram following the introduction of 60 cubic centimeters 12.5 per cent solution of sodium iodide through the ureteral catheters. The bladder sigmoid descending colon and transverse colon are all outlined. The opaque catheter can be made out in the fistulous tract between the bladder and sigmoid.

On November 1 1925 (open ether) through a medium hypogastric incision a dense mass of adhesions between the small intestine sigmoid and bladder were exposed and separated by scissor dissection. Communication was found to exist between the sigmoid and bladder. The opening in the sigmoid was invaginated and reinforced by two appendiceal epiploica. Adherent loops of ileum one to the other were then separated and the raw surfaces peritonized. The tip of the appendix was then separated from the adhesions and appendectomy done. The abdomen was explored. The wound was closed in layers with a rubber tissue drain to the bottom of Douglas pouch.

Findings. On separating the adhesions in the pelvis we found that there were three parts involved: the bladder sigmoid and two coils of terminal ileum about 6 inches from the caecum together with another coil of ileum from higher up. The hole in the sigmoid was obliterated by invagination as was the one in the bladder. When this was done on following up the adhesions of the terminal ileum it was found that the tip of the appendix was adherent to the caecum between the bladder and the sigmoid and also to the smaller intestine. This must have been due to a ruptured appendix followed by abscess and communication between bowel and bladder.

Patient made an uninterrupted recovery.

July 6 1926 Symptoms completely cured. The urine still contains some motile rods no pus or sediment.

SOME OTOLOGICAL PROBLEMS¹

BY E. H. CARY, M.D., F.A.C.S., DALLAS, TEXAS

I WISH to approach some otological problems from the sociological and clinical aspects. Macleod Yearsley in 1925 stated that a survey of otological literature for that year gave greater promise of advance in knowledge of the ear than a review of the previous 25 years. He credits this advance to the effort made toward the prevention of deafness which of course means as well the study of those diseases of the ear destructive to hearing.

I shall hope to develop the same thought in a thesis for this occasion.

If it is true that we have as many hard of hearing in this country as the available statistics indicate there being over a million then we are feebly palliatively wet nursing the great mass who have not yet lost their optimism and come to us for help. We are caring for the ones who come our way honestly striving to relieve them and in many ways we render valuable service. It is true we know our limitations, it is also true we too frequently speak of our limitations thereby failing to serve when much could be done.

However a more serious effort can be made to prevent the occurrence of the so frequent loss of hearing. You promptly ask "How?" To answer this question in detail would be a repetition of much that you have had before you therefore I will content myself by making suggestions regarding therapy.

It is generally believed that approximately 85 per cent of all deafness is due to middle ear involvement. Ninety per cent of these middle ear infections have their origin in inflammatory conditions of the nasopharynx with extension to the ear by way of the eustachian tube. If these two statements are approximately true then it is quite evident that we have already gone far to prevent thousands from becoming deaf through having popularized the surgery of the nasopharynx as well as of the associated lymphoid tissues in the fauces.

No surgeon should leave untreated the continued inflammatory reactions which often remain after the removal of tonsils and adenoids. In such patients the definite nasal and sinus infections are the associated factors in the persistent inflammations of the middle ear which determine the final loss of hearing. These sinus infections are just as easily cured as the pharyngeal inflammations in the hands of trained and capable specialists.

This type of surgery properly performed has undoubtedly greatly lessened the number of the deaf.

It is also true that there has been an unnecessarily large amount of bad surgery performed by those more interested in other phases of the question than in the pathological and physiological points involved. On the whole however there has been an advance in service rendered and the general results can be commended. It remains for the profession to separate the good from the bad and to use its knowledge to further prevent chronic middle ear disease and its resulting deafness.

Hays' very complete paper written in 1911 calling for measures which are needed for the prevention of deafness during early life can be mentioned for your perusal and I can avoid a repetition of similar ideas.

I particularly commend to you the educational phases of the problem of the prevention of deafness. Well directed conservative propaganda which goes a step further than educating the parents, teachers and physicians to those factors which give rise to deafness should certainly reach children in early school life through teaching them the facts concerning the functions of their petal senses, the influence of consanguinity and heredity, prophylaxis and relief measures. The facts should be presented to them in simple but effective language.

There should be conducted in every school health examinations which would bring to light defects of the children and the potential



Fig 1 Squamous cell epithelioma Grade 3 (Case 13)



Fig 2 Papillary adenocarcinoma Grade 1 (Case 2)



Fig 3 Adenocarcinoma Grade 2 (Case 14)

The amount of fibrosis hyalinization and lymphocytic infiltration in the tumor was not considered in the present study.

Carcinoma of the gall bladder is Grade 1 when the epithelial cells showing differentiation constitute three fourths or more of the total epithelium Grade 2 when the epithelial cells showing differentiation constitute from one half to three fourths of the total epithelium Grade 3 when the epithelial cells showing differentiation constitute from one fourth to one half of the total epithelium and Grade 4 when the epithelial cells showing differentiation constitute one fourth or less of the total epithelium.

Of the thirty cases in the present series the malignancy was Grade 1 in two cases Grade 2 in twelve Grade 3 in eight and Grade 4 in eight (Figs 2 to 7).

Definite differences both in the clinical and operative findings, and in the prognosis can be noted when the fourteen cases graded 1 and 2 (Group A) are contrasted with the sixteen cases graded 3 and 4 (Group B). Palpable tumors were present in two cases in Group A and in twelve in Group B. Extension or metastasis to other organs was present in four cases in Group A and in fifteen in Group B. Excluding four patients who died before leaving the hospital (two in each group) the

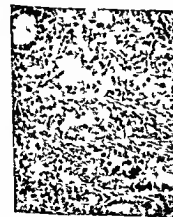


Fig 4 Adenocarcinoma Grade 3 (Case 16)



Fig 5 Adenocarcinoma Grade 4 (Case 23)



Fig 6 Squamous cell epithelioma Grade 2 (Case 9)

trician who sees the sick baby establishes an early diagnosis after studying the tympanum. He then takes no chances regarding hidden evedates. They who believe a creamy white membrane hides an abundant toxic element can save a reasonable percentage of infants from deafmutism.

We are rapidly coming to a time—in many cities the time is already here—when the pediatrician can seriously discuss with us deafmutism and its prevention with the prospect that he will observe early signs of disease evidently insidious and hidden to a physician less well trained. By this means some cases of deafmutism acquired from infectious diseases which are now considered unpreventable might be prevented.

If the child is to be saved from this acquired affliction he must be saved when the acute infection is present. No one believes there has been a suppurative labyrinthitis in these persons who have lost their hearing. It has evidently not gone beyond a serous labyrinthitis. Suppurative labyrinthitis is no doubt associated with cases that go to necropsy.

I question a history given by a member of the family at a late date to the effect that the child had pneumonia or any other infectious disease and there was no inflammation of the middle ear but my child has been deaf ever since. The basis of reaction may be contiguous infection rather than circulation of toxins through the blood which finally affect a part of the body through accident or affinity. I appreciate the fact that this opinion may be the subject of argument. Basing my argument on the grounds of selective affinity, you may at once call my attention to the fact that in the infant there must be some relation between infection of the mastoid and the remote disturbances of the intestinal tract with dehydration, fever, rapid loss of weight, leucocytosis, etc. In these children an autopsy study fails to show an intestinal lesion and this fact suggests some unproved metabolic disturbance.

On the other hand I call your attention to the case in which there is a very large mastoid antrum more or less filled with an inflammatory exudate but not quite sufficiently to

produce necrosis with frequently a tympanic but not sagging membrane, in which it is denied that this would pollute the milk and food of the infant from tubal leakage infect the intestinal tract and be followed by the complications just named. The otological basis of reaction in this case is so remote that we have only lately found through co-operation with the baby doctor that such a thing is possible. Our only danger now is that through their enthusiasm and lack of surgical judgment, an uninformed baby doctor and otologist will discredit the most interesting piece of work done in years. I have had occasion to observe this phase of the situation already.

I agree with Dr Shambaugh in the following. With few exceptions the absence of vestibular responses in cases of acquired deafness mean the presence of total deafness and conversely the presence of vestibular responses whether normal or subnormal suggests the likelihood of some remnant of function remaining in the cochlear mechanism that is some remnant of hearing. In congenital deafness vestibular responses are more often present than absent. In acquired deafness it is unusual to find any vestibular responses. In acquired partial deafness vestibular responses are more often present than absent. It is evident that malformations or congenital defects of any kind if not obliterative would leave areas for vestibular actions whereas any inflammatory process great enough to destroy all of the hearing would usually destroy all vestibular responses and vice versa.

My plea would be to make a greater effort to enlist the co-operation of the men who see these cases of infectious fevers.

Now passing to the next great cause of deafmutism we find that 50 per cent of deaf mutes are apparently born deaf and are classified as congenital cases. Consanguinity and heredity would seem to affect the child as regards inherited tendencies. Consanguinity would seem to be highly operative in its influence when the individuals have similar blood probably the same unusual type and subject to the same opsonic index as regards a given infection and with similar

TABLE II—(Continued)

C	S	Abt cl of h y	Ch act f pan	I t m t	L p t d	P l b t m	D g c t g ill t	S t e t d t per t	F t m	D t a t t t c p t m th

CASES OF MALIGNANCY GRADE 3

15	M 53	Constant pain in right epigastrium for months	Constant ache to back	0	25	+	0	+	Liver	5
16	F 39	Attacks of hot flashes. Bloating and tenderness of abdomen backache 2 months	Not recorded	0	16	+	0	+	Ovary	5
17	M 51	Almost daily pain in right hypochondrium for 3 months No digestive complaint	Severe at times	0	22	0	+	+	Liver	4
18	M 63	Spells of upper abdominal colic for 8 years Jaundice with pain 8 months	Severity gradually increasing	+	0	+	+	+	Lymph nodes	3 5
19	M 63	Inidious onset of cachexia and icterus 3 months duration	No pain	+	26	+	+	+	Common duct	3
20	F 50	Attacks of epigastric pain occasionally with jaundice for 7 years	Severe to back	0	0	0	0	+	Lymph nodes	2
21	F 64	Onset 6 months before admission with cachexia pain in right costal margin for last 5 weeks	Mild	+	+	0	+	+	Liver	0
22	F 63	Attacks of epigastric pain for 26 years jaundice since last spell 5 weeks before admission	Colicky to back	+	23	0	+	+	Liver	0

CASES OF MALIGNANCY GRADE 4

23	F 50	Attacks of pain in left hypochondrium pain radiates to interscapular region First attack 6 months before admission No jaundice	Dull aching	0	8	0	+	+	0	13
24	F 58	Spells of epigastric pain radiating to right shoulder for 9 months Residual tenderness	Sharp severe	0	8	+	+	+	Liver	10 5
25	F 55	Dyspepsia Almost daily discomfort left hypochondrium for 6 months	Not recorded	0	+	+	0	+	Liver	6
26	F 61	5 months before admission began to lose weight strength and appetite Never any pain or epigastric tenderness	No pain	0	40	+	0	+	Liver duodenum	4 5
27	F 59	Attacks of pain under right costal margin for 2 years Almost constant ache for last 6 months	Variable in intensity	0	30	+	+	+	Liver	4 5
28	F	Dyspepsia belching vomiting most distress 4 hours after meals solid food aggravates duration 5 months	Epigastric distress	0	13	+	0	+	Liver omentum duodenum	2
29	F 62	One year before admission first noted fatigue and malaise almost daily discomfort or pain in epigastrium for months	Discomfort	0	9	+	+	+	Liver	1
30	F 49	Right upper abdominal pain many years Dyspepsia for 3 years Jaundice with one attack	Severe radiating to back	0	0	0	+	+	Liver	0 5

P l c t m o C l l y d s e w d f l e m l w i t h o v e r C o f S e c t o n o f d t r e m v e d w i t h i m o r A f f e c t e d p a t t l
 C l c l y d g n o s e d i m o o f l C l c l y d g n o s e d a s s t a b l e b e c c o f f r e C l c l y d g n o s e d d e c l l

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LYMPHATIC INVOLVEMENT IN CASES OF CARCINOMA OF THE PYLORIC END OF THE STOMACH¹

By FRIDERICK A. BOTHE, M.D., ROCHESTER, MINNESOTA

From the Mayo Clinic

A STUDY was made of 100 cases of carcinoma of the pyloric end of the stomach with involvement of the perigastric lymph nodes in which a portion of the stomach including the growth had been resected at the Mayo Clinic. There was no evidence of metastasis to more distant lymph nodes or adjacent organs. The resected neoplasm with the affected perigastric lymph nodes as well as the case records was studied in each case.

The cases of carcinoma of the stomach which are treated surgically may be divided into two groups: those without metastasis and those with metastasis. In the cases of the first group the results of surgical treatment were more gratifying. When metastasis was present the results were sometimes discouraging. The cases in which there was metastasis should be subdivided into two groups: the one with metastasis to the perigastric regional lymph nodes and the other with metastasis to more distant lymph nodes or adjacent organs. Hence the cases presented here lie between those without metastasis that are definitely operable and those with metastasis to more distant lymph nodes or adjacent organs which are either inoperable or only treatable by palliative measures.

Lengemann studied the regional lymph nodes which were removed with specimens of carcinoma of the stomach in the clinic of Mikulicz. He found that the coronary lymph nodes were diseased in 50 per cent of the cases, the nodes along the greater curvature in 37 per cent and the retropyloric nodes in 60 per cent. Forty-two per cent of the 302 nodes which he found were involved. Renner in the same clinic studied the lymphatic involvement in gastric carcinoma in 15 cases at necropsy. He found 50 per cent of 78 nodes of the subpyloric group involved. Cuneo studied carcinomatous stomachs from necropsy cases and after resection. He did not con-

sider his studies to the lymph nodes alone but included also the lymphatic system in the wall of the stomach by means of a modification of Genot's method of injecting the lymph spaces and vessels. He found that the nodes of the lesser curvature were affected in 87 per cent of the cases examined and those of the greater curvature in 66 per cent. He has seen only the retropyloric group involved in 2 cases. He believes that a marked tendency is shown toward invasion of the lymph nodes of the lesser curvature. MacCarty and Blackford studied 200 specimens which had been resected or excised from the stomach in cases of carcinoma at the Mayo Clinic. Each specimen was studied immediately after its removal and again in fixed section. Their study included three groups of cases: those with no involvement of lymph nodes, those in which some of the nodes were involved and those in which all nodes were involved. The nodes were charted on diagrams; this plan has been used in the present study. In the cases in which nodes were involved they found 106 nodes, 57.6 per cent of these were affected. They also showed that the size of a lymph node is no criterion of the presence or absence of carcinoma.

TECHNIQUE

All the specimens examined in the present study had been fixed in 10 per cent formalin. The size, type and situation of the growth were noted. The site and relative size of all of the lymph nodes that could be found with each specimen were noted and recorded on diagrams. One half of each node was numbered, frozen, cut and stained with hematoxylin and eosin. These sections were then examined microscopically and the findings recorded on their respective diagrams (Figs. 1 to 8).² Owing to the great number of nodes,

¹The diagrams have been those from group I of the illustrations. The more extensive dissections of the lymphatic system in the stomach were made by the University of Minnesota, School of Medicine, Department of Surgery, St. Paul, Minn.

operation which will unquestionably have a most beneficial effect on the hearing of this coming generation. Progress has also been made in drawing the attention of the medical profession and the public to the importance of accessory nasal sinus inflammations as a frequent cause of middle ear inflammations in infants, children and adults. Sinus disease education, first of the otolaryngologist himself and through him of the medical profession and the general public is one of the important immediate tasks of organized otolaryngology, just as the tonsil and adenoid question was the problem of prime import 10 years ago.

Diet deficiency—especially vitamin A—as a cause of sinus disease has been demonstrated by Amy Daniels of the University of Iowa School of Medicine. She has fed mice into or out of sinus disease by decreasing or increasing this vitamin. The assumption already fairly well established is that humans react likewise. The otologist is thus furnished an additional means of deafness prevention.

Doctors George and Clady Dick of the MacCormack Institute for Infectious Diseases have placed a new obligation on otolaryngologists. The Toxæmia of scarlet fever disappears with the use of their serum within 7 days. Thereafter the toxic symptoms are due to focal infections almost always located in the ears or accessory nasal sinuses. The prompt recognition and treatment of these falls squarely on the shoulders of the otolaryngologist. Prompt action on our part will eliminate scarlet fever to a very large extent as a cause of deafness.

The cause and prevention of otosclerosis is another matter which commands our attention and careful consideration. The Committee of the American Otological Society of which Norval H. Pierce is chairman fully equipped with funds for thorough investigation should help to solve this old question that has puzzled otologists.

Deafness prevention as Doctor Cary has so timely stated can be greatly promoted by (1) regard for consanguinity and heredity (2) more frequent and earlier ear examination by otolaryngologists and (3) pre-natal care.

I wish to emphasize the last two.

More frequent ear examination by otolaryngologists should be made in every obscure febrile disturbance in infants, children and adults. Waiting

for pain to point out the affected ear too frequently leads to extensive mastoid disease and often labyrinthine destruction. If the mastoid disease is bilateral total deafness results with very defective or entire loss of speech as an inevitable consequence. The general practitioner and pediatrician should turn such cases over to the otologist early and not after paracentesis or spontaneous drum rupture has occurred. The most dangerous acute conditions of the ear are those that are silent. The cases of mastoid disease caused by influenza and pneumonia during the late war emphasize this fact. Cases of the exanthemata in infants and children especially those with extensive toxæmia are known to be without subjective symptoms.

Routine physical examinations through school age and adult life with examinations of the ear, nose and throat conducted by otolaryngologists will go far toward the prevention of chronic otitis media of the catarrhal form by instituting early and proper nasopharyngeal and rhinological hygiene. Many cases of nerve deafness might be prevented also by their early recognition. Our specialty a voice has scarcely been heard in the campaign that is spreading over the country to popularize periodical health examinations.

Prenatal care as a means of deafness prevention has received almost no attention whatsoever up to the reading of the present paper. Physicians have long recognized the importance of syphilis in its relation to the child in utero. Other diseases of the mother may be of equal consequence in the development of an ill formed child. Ear defects may be as frequent as malformations of any other part of the body under these circumstances. Conversely it is not reasonable to believe that a vigorous healthy mother safeguarded during pregnancy from infectious diseases of every kind by every means possible, nourished by food of proper combination and adequate amount may be expected to bring forth a child perfectly formed and free from congenital defects of the ears as well as the rest of the body?

It is hoped that otolaryngologists will see the need of prenatal care and appreciate that the ear is as frequently subject to malformations as any other organ. Our influence should be given to the education of the general profession and of the public to this end.

serial sections were not made of those that are recorded as not involved. The nodes which were found to be affected were charted on the diagrams in solid black. Those which were not involved were charted in outline only. In some specimens the carcinomatous tissue had extended beyond the capsule of the lymph nodes; this was indicated by an irregular rough outline. The growths were then drawn in on the diagrams diagonal lines representing the extension of the growth on the anterior wall of the stomach and stippling the extension of the growth on the posterior wall of the stomach.

RESULTS

In the 100 specimens examined 824 lymph nodes were found. Fifty five per cent of these were found to be carcinomatous. It was impossible to learn definitely which nodes were the first to become affected. However, those situated closest to the entrance of the coronary vessels on the lesser curvature and those closest to the pylorus on the greater curvature were found to be involved most consistently. It is not at all impossible that the findings of Jamieson and Dobson that some of the collecting trunks of the lower end of the pylorus slip by the lower coronary group of nodes to terminate in the nodes situated near the falx coronaria may explain the consistency of the involvement of the nodes nearest the point of entrance of the coronary artery. The nodes on the lesser curvature were affected in 91 per cent, those on the greater curvature in 69 per cent, and those on both curvatures in 60 per cent. These figures correspond to the findings of Cuneo.

The size of the nodes seemed to bear no definite relation to their involvement. In 12 specimens the largest nodes found were not affected whereas smaller ones were. In 38 specimens nodes were found which were not affected but were considerably larger than some in the same specimen which were affected. In the 38 specimens the growth was found to be ulcerative in 27 and of the fungoid type in 11. This is in accord with the observations of MacCarty and Blackford.

It is generally believed that the carcinoma cells invade the lymph nodes by a process of



Fig. 9. Early carcinomatous involvement of a lymph node with infiltration in the peripheral sinuses.

embolism, a few cells having been broken off from the primary growth and been carried to the lymph nodes along the lymphatic vessels. Billroth, Bozzolo, MacCarty, and Blackford, Rindfleisch, Orth, Zehnder, Petrick, and Cuneo have all shown that carcinoma cells are found in the peripheral sinuses early in lymphatic involvement. This is explained by the anatomical structure of a lymph node in that the afferent lymphatic vessels enter the node at the cortex and form a network of peripheral sinuses surrounding the follicles. Figure 9 shows early involvement of a lymph node with carcinoma cells in the peripheral sinuses extending toward the medullary portion of the nodes between the follicles. It may be noted that the carcinoma cells do not extend into the follicles, which is in accord with Cuneo's observation that the lymphatic capillaries do not pierce the follicles but pass around them. Figures 10 and 11 show more advanced involvement of a lymph node.

The lymphatic vessels of the gastric wall form a subserous network before they unite to form the collecting trunks which lead to the regional lymph nodes. When these vessels become involved they show up in the fresh tissue as whitish streaks and minute nodules. Figures 12 and 13 show two specimens which illustrate involvement of the subserous network of vessels.

A distinction was drawn between the large ulcerating growth and the small ulcer which had undergone malignant change

The situation of each growth was noted Fifty nine per cent were found on the lesser curvature 34 per cent were annular and situated just above the pylorus 4 per cent were on the posterior wall and 3 per cent on the greater curvature This would indicate that carcinoma of the stomach almost always occurs on the lesser curvature and quite rarely on the greater curvature The situation of the growth did not necessarily determine the exact site of lymphatic involvement There were 8 specimens in which the lesion was on the lesser curvature and the nodes of the greater curvature showed relatively greater involvement there were 7 specimens in which the growth was situated on the lesser curvature and there was equal involvement of the lymph nodes on both curvatures In these specimens the number of nodes found on each curvature was taken into consideration as there were other cases in which more nodes were affected on the greater curvature but not relatively more since many more nodes were found on the greater than on the lesser curvature when the specimen was examined These instances seem to show the importance of removing all the lymph nodes possible on both curvatures of the portion resected

The largest growth which was examined measured 14 by 11 centimeters the smallest growth measured 2 by 1 centimeter In spite of the difference in the size of these two specimens the smaller one showed involvement of all of the lymph nodes which were found with the specimen whereas with the larger only 5 nodes were affected of 15 found There were other similar instances This again coincides with the findings of MacCarty and Blackford that small growths or ulcerations may show complete involvement of the lymph nodes whereas many of the larger growths do not It is evident therefore that the size of the lesion is no guide to the condition of the lymphatics

It was found that the life expectancy was definitely diminished when the glands of the greater curvature were involved

CONCLUSIONS

- 1 The lymph nodes in closest proximity to the primary lesion are not necessarily those to be affected
- 2 The nodes nearest the entrance of the coronary vessels and the pylorus on the greater curvature were found to be affected most consistently
- 3 The size of the lymph node bears no definite relation to its involvement
- 4 The size of the growth bears no relation to the number of lymph nodes involved

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A young man from Jefferson City, Missouri, arrived in St. Louis late one afternoon saying that he had suddenly lost his sight in both eyes that morning. After a few minutes the sight in one eye returned but the other remained impaired. It was reduced to recognition of hand movements at one meter. He stumbled and ran into things in walking about due to the sudden loss of binocular vision. He gave a history of persistent headaches for 2 weeks previously. Ophthalmoscopic examination showed no cause for the loss of sight. Rhinological examination by Dr. Sluder made within an hour showed acute general swelling of the nasal mucosa practically closing the nostrils on the side of the affected eye. Attempts to reduce this swelling were continued throughout the night at St. Luke's Hospital. About 5 o'clock the following morning there was a copious discharge of pus and blood from the nose with prompt restoration of normal vision. Three days later a temporary obstruction to nasal drainage was revealed through a marked loss of vision in the same eye found in the routine daily visual test. After that there was an uneventful recovery.

The sudden onset and the immediate relief following appropriate nasal treatment without any demonstrable pathological change in the ocular tissues indicates that the disturbance of the function of vision was due to pressure upon the optic nerve. The absence of other signs of any functional disorder of the nervous system and the discovery of a definite pathological condition involving the postethmoidal and sphenoidal sinuses on the side of the affected eye dispose of the possibility that this might have been a hysterical manifestation.

Both the beginning and the subsidence of pressure upon the optic nerve may be gradual as shown by the following clinical examples.

Miss A. B., age 36, reported May 30, 1922, that the vision of her left eye had been cloudy at times during the previous week as though mucus covered the front of the eyeball. She had worn glasses for 3 years and at once consulted the oculist (Dr. M.) who had prescribed these glasses for her. He found no lesion in the left eye in account for the loss of vision and tried to persuade the patient that her eyesight in the affected eye was as good as ever. His suggestions and therapeutics were an utter failure. Examination showed normal vision in the right eye but an inability to recognize even the largest test types at any distance with the left eye. Central vision in the left eye was reduced to an uncertain recognition of the direction of hand movements at one foot but she retained the ability to count fingers at one foot at the extreme temporal periphery of the field. Nasal examination on the same day by Dr. Greenell Sluder revealed a left sided sphenoidal abscess. The sphenoidal suppuration in this case gave rise to little if any pain or subjective discomfort except the loss of vision.

Medical treatment and suction tried for 3 successive days only brought sight in the left eye to 20/50. Thereafter a radical sphenoidectomy was done by Dr. Sluder on the fourth day. One week later vision in the affected eye was improved to 16/75. At this time ophthalmoscopic examination suggested a possible slight edema of the macula which soon disappeared. At the end of 2 weeks normal vision had been restored to the affected eye. A

careful search for a central scotoma with the aid of the Bausch & Lomb stereocampimeter at this time failed to reveal any defect nor was there any increase in the normal blind spot. This patient has been kept under regular observation at long intervals. Vision has remained normal in each eye and at no time has there been a departure from the normal ophthalmoscopic appearance of the optic nerves of either eye. Both onset and relief in this case proceeded in a more gradual and yet in an unmistakably characteristic manner. Incidentally this case teaches that no time should be wasted in suggestion for the restoration of vision even if there is no pathological change in the ocular fundus or media. The possibility of nasal sinus disease must first be eliminated.

In the next case the onset was even more insidious but recovery was very prompt. This case was rather unique in its uniform simultaneous bilateral loss of vision.

Celeste A., age 14, was examined January 28, 1924, on account of nearsightedness. With -2.0 spherical lens for each eye vision was equal to 20/15. These glasses were prescribed. One week later vision was found to be the same and the patient was entirely comfortable in her school work as well as in the general use of her eyes. Regular routine in section of myopic school children at monthly intervals is always demanded until it is definite that there is no further increase in myopia. At the end of the first month it was noted that there was a slight loss of visual acuity. It was assumed that there was some increase in the myopia. Monocular atropinization was used for several weeks and careful limitation of the amount of near work provided. After another month it was apparent that vision in each eye had been reduced to 20/30 with the best correction by glasses that could be determined. Also the patient had several severe headaches. Ophthalmoscopic examination revealed nothing abnormal in either eye. A nasal examination was now advised. Dr. H. W. Loeb found a chronic ethmoiditis, some deflection of the septum and hypertrophic tonsils. After palliative nasal treatment vision was restored to 20/15 and headaches ceased by 1 after 4 days vision again fell to 20/30 and in 3 days more to 20/40 and 2 days later it was only 20/50 in each eye with the best possible correcting lens. Tests failed to reveal any discrepancies in the patient's answers. Headaches too returned though they were not so severe as at first. The ophthalmoscopic appearance remained normal. At this time Dr. Loeb curetted the right ethmoidal cells and 4 days after this operation the sight of the right eye was restored to 20/20+ while the vision of the left eye was still 20/40 minus. Operation was therefore advised on the left side. It was not done until 2 weeks after the right ethmoid had been evacuated. Dr. Loeb reported the finding of two small polyps and a very tiny cell (almost obliterated) in the left ethmoid. Following the evacuation of the left ethmoid vision was 20/15 in the right and 20/20+ in the left. One week later vision was 20/15 for each eye and no change of the original glasses was indicated. In fact vision was now better with them than when they were first prescribed. This excellent vision has remained for the last 2 years.

In this case the loss of vision was the same in each eye. The onset was extremely insidious but there was a steady and persistent loss which threatened serious consequences. No pathological changes in eyes were present to explain the loss but a definite diagnosis could be made of

not alone in its local manifestations but as a continuous and constant systemic process

It is only necessary to observe the demography of the gorter patient to realize the close and rapid interrelationship of the local vasomotor mechanism of the nose and throat with that of the general system

The remote effects of nasal obstruction on the respiratory organs and the body at large are best demonstrated by the experiments of Anderson at the Detroit College of Medicine. A series of 100 guinea pigs, rabbits and dogs were subjected to partial or complete closure of the nostrils by the use of cotton or collodion or denuding the nasal surface and suturing while the animal was under ether. All pigs with complete stenosis died from 2 to 8 hours later with marked distention of the abdomen from swallowing air. The effect on pigs with one nostril closed was death in 2 hours to 9 $\frac{1}{2}$ days although 2 lived 8 months. Rabbits with one nostril closed died on an average within 45 days. Those living the longest developed asthma and emphysema infection and acute dilatation of the heart. Puppies died in 60 days. Of 14 pups born of mothers with a $\frac{3}{4}$ nasal obstruction 11 died within 61 days. Older dogs developed the signs of scurvy with almost complete loss of hair and great wrinkling of the skin.

These experiments upon animals show the following facts

- 1 Nasal obstruction leads to death or serious impairment of vitality
- 2 It causes lowered resistance and predisposition to infection
- 3 Local disease of the respiratory tract is induced
- 4 Obstruction of the nostril leads to dilatation of the heart
- 5 Changes in the skin and blood are most marked
- 6 Symptoms resembling asthma and emphysema often occur with histological change
- 7 Re-opening the occluded nostrils is followed by prompt disappearance of the symptoms

These experimental proofs of the profound systemic and toxic effects of nasal stenosis are undoubtedly in direct relation to the toxic effect of the disturbed blood chemistry. We

are well aware of the importance of intestinal toxæmia and its relation to the acute and chronic inflammations in the ear, nose, and throat but the relation of disturbed lung chemistry and the air contained therein is a newer field that is not sufficiently appreciated. The exchange of oxygen and carbon dioxide, the elimination of excrementitious material, organic substances and watery vapor is an elementary fundamental of physiology. The relation of the proper discharge of the 100 cubic inches or more of residual air, especially from the apices of the lung and its toxins to the problems of obstructed nasal respiration is a new chapter with faint elucidation. Digitalis, ergot, and quinine have a distinct physiological action according to the mechanism of cell selection. The toxins of residual air have a definite action on the cell as demonstrated by Delos Parker at the Detroit College of Medicine. If the residual air is blown into a basin containing a solution of lime water and the same evaporated, a fine layer of snowy white crystals will remain. The chemical combination is redissolved in distilled water and injected in a series of varying strengths into a pigeon and a dog. An increasing disturbance of cell chemistry takes place with the selective action of the poison manifested particularly on the ectodermic tissues. The hair or feathers fall partially or completely as the toxæmia advances. The animal becomes bald. If costal breathing is accentuated in the dog by means of a corset, the hair is rapidly restored.

The effects of nasal obstruction may therefore be most remote and hidden in the blood chemistry. It is true that individuals with most complete nasal occlusion may go through life without apparent damage. We must appraise and value the necessity for surgical interference with the greatest care. The indications for a submucous resection of the nose or the removal of tonsils and adenoids together with other obstructive lesions have classical rules of application of definite value. The future may add other indications observed by findings in the blood chemistry and measured by laboratory methods. It is my belief that our good work does not end with the simple surgical procedure. It is taken for granted that all pathological tissue is removed.

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Another criticism was that these functional ocular disorders might be hysterical. This must be answered by a search for other clinical signs of hysteria by study of the visual fields and by the cure of the ocular disorder on elimination of the nasal irritation.

Painful accommodation is sometimes explained by the cooperation of the superior obliques in convergence. This action causes traction on the pulley of the oblique muscle and may give rise to local pain if there is frontal sinusitis.

Even though the measurable effect of each is an uncertain quantity it is well to remember in connection with functional ocular disorders that conditions in the nasopharynx may give rise to reflexes which are carried to the floor of the fourth ventricle over the trigeminal and returned to the eye through the distribution of the third, fourth, sixth or seventh nerves and that sensations of pain originating in other branches of the fifth may be referred to its ophthalmic branch. Fuchs calls attention to the fact that the ophthalmic branch of the trigeminal runs through the cavernous sinus to the superior orbital fissure and in this part of its course lies close to the lateral surface of the body of the sphenoid. He gives this as the reason why it may react under the form of occasional neuralgias to an inflammation of the mucous membrane of the sphenoid sinus.

The great variety of functional ocular manifestations of diversified etiology related to the nasopharynx requires the closest possible cooperation between the rhinologist and the ophthalmologist in order that a diagnosis may be made and the proper treatment administered.

CONDITIONS OF THE EYEBALL RELATED TO PATHOLOGICAL CHANGES IN OCULAR TISSUES

No ocular structure is immune to pathological changes arising from the nasopharynx. There is no reason why any of the tissues of the eyeball should be exempt. With the possible exception of the conjunctiva, their vascular and lymphatic supplies are identical. Hence we may have various forms of superficial or interstitial keratitis, iritis, cyclitis, circumscribed or disseminated choroiditis, hyalitis, cataract, retinitis including retinal perianteritis, phlebitis or thrombosis, papillitis, optic neuritis or neuroretinitis, retinobulbar neuritis, toxic optic atrophy, etc. in any or all of which etiological investigation may lead to the

nasopharynx as the cause of the condition. Conditions in the nasopharynx seem also to have more than a casual relation to the three great but bears of ophthalmology—glaucoma, retinal detachment and sympathetic ophthalmia. The extent or importance of the latter associations will not be known until the obscure etiological problems pertaining to these diseases have been solved.

There is no special type in these inflammations in the various tissues of the eyeball that positively identifies them as being due to diseases in the nasopharynx. Clinical familiarity with certain types may lead to a strong suspicion that this or that case seen for the first time is of rhinopharyngeal origin but the actual diagnosis can only be made by exclusion. Various unsuccessful attempts have been made to designate certain variations in the appearance of the optic disc or defects in the visual field as exclusive diagnostic signs of rhinopharyngeal disease. There are no reliable short cuts to a complete diagnosis which would determine the etiological factors. The whole patient must be studied.

Pathological ocular lesions may be so minute as to be found only after the most persistent and searching examination calling for all the various instrumental aids that have been devised to assist in ophthalmic diagnosis. On the other hand the pathological process involving the eyeball may be so extensive and severe that total destruction or disorganization follows immediately. Fortunately such annihilation is rare. These violent types are caused by actual bacterial invasion either by contiguity or by metastasis. The milder types which may however be very dangerous to eyesight are more often due to toxins. Ocular infection by contiguity from the nasopharynx may reach the eyeball by extension through the orbit or more superficially by the continuity of the nasal mucosa through the nasal duct and lacrymal sac.

The pathogenic organisms most often present in conjunctivitis or dacryocystitis of nasopharyngeal origin are the pneumococcus or some variety of staphylococcus. Whether the infection has been conveyed to the eye by contiguity, that is by an extension upward through the nasal duct or transferred to the eye indirectly by fingers or handkerchiefs often remains unanswered. Obstruction of the lower end of the nasal duct is a frequent primary factor in the etiology of dacryocystitis but infection of the sac probably is brought about more often after drainage ceases by bacteria carried into the stagnant secretions from the conjunctival sac. The most satisfactory results from the treatment of the lacrymal sac

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even below zero thus straining the marvelous equalizing function of the vasomotor centers and destroying their necessary tone. These acts certainly produce chronic hypertrophic change and frequently with attending infection. The artificial environment and mode of life of the modern Caucasian being taken into consideration it is not difficult to understand the profound influence these changes exert upon the development of early pathological conditions or physical defects. The balance between the physiological and pathological state is destroyed in spite of the maintenance of the powerful endocrine control over the vasomotor system.

While occupations and habits predispose to loss of vasomotor tone and to infection we can scarcely hope to eradicate chronic rhinopharyngeal disease. The hope of amelioration lies in a brilliant scientific future when the Cauca-

sian child will be reared in less artificiality with an opportunity to adjust his respiratory passages to natural climatic environment. The surgery for the relief of obstructive lesions will become more and more efficient and follow standardized rules of application.

It is my belief however that we are near the dawn of an understanding of the laws of immunity and metabolism that will revolutionize many present methods of procedure. The untold prophylactic value of toxin antitoxin for diphtheria antitoxin for scarlet fever measles and tetanus and of typhoid inoculation is now well known.

Our hope lies in proper immunization the maintenance of endocrine balance the restoration of proper facial development by scientific feeding vitamin supply and outdoor life. Meanwhile otolaryngological surgery will progressively maintain its usefulness.

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possibilities as well. Routine examination of children's ears in school is just as important as investigation of their eyes. Preventive measures of far reaching effect can be instituted at this stage of the child's life.

Health examinations as a routine for the young without regard to school, with the idea of keeping the child fit would be the means of training the future men and women to periodical inquiry as to their well being.

Curative measures to the limit of our capacity should go hand in hand with preventive measures and it should come to pass that the profession would profit in an effort to prevent disease with greater satisfaction to themselves.

In the *Archives of Oto Laryngology* Shambaugh et al. present 'Statistical Studies of the Children in the Chicago Public Schools for the Deaf' which is one of the most complete studies made of a given number of children that I have had the pleasure of reading. They have data concerning about 90 cases that were thoroughly analyzed.

Taking statistics made elsewhere into consideration I believe the information reasonably complete. The facts may be applied to over nineteen thousand children similarly situated in schools for the deaf in the United States. We must allow for the percentage variance in classification in the tabulation of congenital or acquired causes which seem to have some relation to racial tendencies and national environment. Shambaugh states that of the 145 classified as acquired deafness there was no history of middle ear inflammation in 85.

The difficulty of making a correct diagnosis in infants is quite obvious. As regards the ear diagnostic surmise would better describe the conclusions of the usual attendants. Children in untold numbers have had otitis media and no one has known it until the discharge appeared. What of the cases in which the pressure was not enough to rupture the tympanic membrane? Could not this type of middle ear involvement in the acute infectious cases tabulated by Shambaugh be the cause of a larger number of cases of acquired deafness in the 50 per cent of those children examined?

Apparently the thought of treatment of the totally deaf as analyzed by Shambaugh would be out of the question and education is the only feasible solution for their betterment. It would seem too that the tabulated causes of acquired deafness occurring in such young children from such a variety of infections could not have been foreseen or greatly influenced even if infection had been recognized at the time the labyrinth became involved.

However it would have been interesting to study the middle ears of these infants in large numbers during the acute stage of the infection with the thought in mind that the infant had been strong enough to resist the infectious disease yet in the battle had unfortunately lost the hearing due to a labyrinthine involvement. With the foregoing in mind can we account for the labyrinthitis by presuming that it was the result of a contiguous local infection? Such an infection might arise in the tympanic cavity this cavity having been filled with an exudate not producing enough pressure to rupture the drum membrane but to have developed a serous labyrinthitis and probably adhesions. Such a general infection has been recognized and tabulated as causing approximately one half of the deaf mutes in the country.

I cannot deny the remote possibility of a hematogenous infection as a cause of serous labyrinthitis but it seems to me that a labyrinthitis is much more likely to result from the middle ear infection. The lymphatic drainage of the middle ear toward the retropharyngeal and parotid lymphatic glands can be upset with pressure when from infection seepage can occur into the internal ear due to blockage of channels below and direct extension into the labyrinth.

I am suggesting that a comprehensive study of those afflicted is not possible until the babies of the land are more uniformly treated by trained pediatricians whose judgment of an ear condition goes beyond the question of pain or a ruptured drum membrane. General practitioners and otologists have been unable to exert much influence the first from lack of information the otologist from lack of opportunity. The trained pediatrician

structed that severe rhinopharyngeal disease and even orbital cellulitis may be present without any intra-ocular complications whatever. To account for the diversity of clinical and experimental observations has been the most baffling phase of our problem. Since physiological and histological research has not produced positive information, we are warranted in adopting an explanation that is in accord with our clinical observations. Permeability of the eyeball for lymphatics need not be the same in two individuals nor in the two eyes of the same individual nor in the same eye at all times. Naturally then the results of tests will not be identical.

The ciliary processes secrete the bulk of the intra-ocular fluid (or lymph). Angelucci and Parsons have emphasized the close histological resemblance between the ciliary processes and the glomeruli of the kidney. Simple filtration combined with selective activity on the part of the epithelium covering the ciliary processes is evident on chemical examination of intra-ocular lymph. It differs somewhat from the general body lymph. Agglutinins and precipitins are allowed to pass freely into the aqueous humor while other substances such as hemolysins are not allowed to pass into it. Agglutinins and precipitins are sometimes considered as a part of the defensive mechanism of the body. This selective secretion on the part of the ciliary processes may be a factor in the protection of the eyeball against bacteria or toxins coming from the nasopharynx or elsewhere. In regard to their action Wells states possibly agglutination favors phagocytosis and lessens dissemination of the infecting organisms but it is not generally considered that the influence on the course of infection is great. It may be looked on as an incident in the infection rather than as a definite method of resistance. However the proposition merits further study.

Another factor in the defense of the eye against rhinopharyngeal disease may be found in the anatomical distribution of blood vessels and lymph spaces. The anterior and posterior segments of the eyeball are almost entirely independent of each other in this respect. The anterior lymph spaces include the interstitial tissue spaces of the cornea (and sclera) the anterior chamber the posterior chamber and the pericellular spaces (spatia zonulara). The posterior group includes the hyaloid canal of the vitreous (canal of Cloquet) the perichoroidal space, and the intravaginal lymph spaces of the optic nerve that is, the subdural and subarachnoid spaces of the sheath of the optic nerve. Parsons esti-

mates that not more than $\frac{1}{100}$ of the lymph secreted by the ciliary processes passes backward into the vitreous. That these arrangements tend to favor the localization of diseases of the eyeball anteriorly or posteriorly is a well known clinical fact.

The perivascular lymphatics of the nasopharynx orbit and eyeball probably play the most important rôle of all in the transfer of bacteria and toxins to the eyeball. Numerous anastomoses between the blood vessels of the nasal mucosa and the branches of the ophthalmic artery and vein furnish possible avenues of approach to the ocular tissues. The presence of perivascular lymphatics in the retina choroid and iris as noted by Parsons and Angelucci provides access to intra-ocular tissues. The perivascular lymph stream probably moves rather slowly and in the direction of the blood stream of the vessel which it accompanies. This partially accounts for the relatively greater frequency with which diseases of the nasopharynx give rise to ocular complications rather than to intracranial lesions. The ophthalmic artery and its perivascular lymph current pass forward with the optic nerve in its intimate anatomical relations to the sphenoidal and postethmoidal sinuses.

Another variable factor in the transmission of bacteria or toxins or both from the nasopharynx requiring further study is the rate of flow of perivascular lymph current. Obviously when the flow is accelerated bacteria and so forth may reach the ocular tissues earlier if permeability permits and hence be more likely to produce lesions. The same is true of toxins. It would be interesting if time permitted to support what has been said about variability in the lymphatic transmission to the eye by clinical reports.

Peters states that the entire intra-ocular fluid exchange is normally slow and the details are still the subject of intense discussion. In certain ocular tissues such as those of the cornea and macula the flow of lymph is certain to be retarded on account of the absence of blood vessels. It is at these points that rhinopharyngeal disease very often gives rise to disease manifestations.

Neither a positive diagnosis of syphilis nor of tuberculosis should permit us to overlook the possibility of rhinopharyngeal diseases in relation to ocular conditions. The slide here shown is made from a microphotograph of a section of an eye enucleated after acute purulent uveitis brought on by metastasis from an acute empyema of the postethmoid and sphenoid on the same side. This patient had contracted syphilis 4 years previously. He had had constant treatment and

possibilities as well. Routine examination of children's ears in school is just as important as investigation of their eyes. Preventive measures of far reaching effect can be instituted at this stage of the child's life.

Health examinations as a routine for the young without regard to school, with the idea of keeping the child fit would be the means of training the future men and women to periodical inquiry as to their well being.

Curative measures to the limit of our capacity should go hand in hand with preventive measures and it should come to pass that the profession would profit in an effort to prevent disease with greater satisfaction to themselves.

In the *Archives of Otolaryngology* Shambaugh et al present 'Statistical Studies of the Children in the Chicago Public Schools for the Deaf' which is one of the most complete studies made of a given number of children that I have had the pleasure of reading. They have data concerning about 790 cases that were thoroughly analyzed.

Taking statistics made elsewhere into consideration I believe the information reasonably complete. The facts may be applied to over nineteen thousand children similarly situated in schools for the deaf in the United States. We must allow for the percentage variance in classification in the tabulation of congenital or acquired causes which seem to have some relation to racial tendencies and national environment. Shambaugh states that of the 145 classified as acquired deafness there was no history of middle ear inflammation in 85.

The difficulty of making a correct diagnosis in infants is quite obvious. As regards the ear 'diagnostic surmise' would better describe the conclusions of the usual attendants. Children in untold numbers have had otitis media and no one has known it until the discharge appeared. What of the cases in which the pressure was not enough to rupture the tympanic membrane? Could not this type of middle ear involvement in the acute infectious cases tabulated by Shambaugh be the cause of a larger number of cases of acquired deafness in the 50 per cent of those children examined?

Apparently the thought of treatment of the totally deaf as analyzed by Shambaugh, would be out of the question and education is the only feasible solution for their betterment. It would seem too that the tabulated causes of acquired deafness occurring in such young children from such a variety of infections could not have been foreseen or greatly influenced even if infection had been recognized at the time the labyrinth became involved.

However it would have been interesting to study the middle ears of these infants in large numbers during the acute stage of the infection with the thought in mind that the infant had been strong enough to resist the infectious disease yet in the battle had unfortunately lost the hearing due to a labyrinthine involvement. With the foregoing in mind can we account for the labyrinthitis by presuming that it was the result of a contiguous local infection? Such an infection might arise in the tympanic cavity this cavity having been filled with an exudate not producing enough pressure to rupture the drum membrane but to have developed a serous labyrinthitis, and probably adhesions. Such a general infection has been recognized and tabulated as causing approximately one half of the deaf mutes in the country.

I cannot deny the remote possibility of a hematogenous infection as a cause of serous labyrinthitis but it seems to me that a labyrinthitis is much more likely to result from the middle ear infection. The lymphatic drainage of the middle ear toward the retropharyngeal and parotid lymphatic glands can be upset with pressure when from infection seepage can occur into the internal ear due to blockage of channels below and direct extension into the labyrinth.

I am suggesting that a comprehensive study of those afflicted is not possible until the babies of the land are more uniformly treated by trained pediatricians whose judgment of an ear condition goes beyond the question of pain or a ruptured drum membrane. General practitioners and otologists have been unable to exert much influence the first from lack of information, the otologist from lack of opportunity. The trained pediatrician

on this most interesting and valuable paper contributed by my friend Doctor Luedde

Illustrative cases have been supplied early in this presentation but as one gets beyond the pressure symptoms with their correlated ocular manifestations one is often left to wonder how our essayist himself would place the various ocular symptoms of photophobia conjunctival hyperemia blepharospasm lachrymation general or local ocular pain muscle volantes scintillating scotoma accommodative asthenopia painful accommodation changes in the visual field keratoconjunctivitis neuroparalytic keratitis mydriasis or myosis and variations in intra-ocular pressure as applied to his original classification of reflex nerve impulses vasomotor disturbance and toxins Cases illustrating these various types of ocular phenomena would have been of distinct value particularly regarding the rôle of toxins or the question of autogenous infections

Doctor Luedde has modestly eluded this possibly unreasonable suggestion on my part early in his paper when he states "It may not be possible to classify every case with absolute precision but some sort of an outline permits a better understanding of the relations between diseases of the nose the throat and the eyes than can be gained by a chaotic presentation of clinical experience. Such an outline Doctor Luedde has assuredly given us but I challenge his statement that his clinical experience is chaotic. The illustrative cases cited in his paper are examples of scientific precision and accuracy"

With this relative relationship between the eye and the accessory nasal sinuses as stated by such authorities as Hjaek Luchs and Moreau about 1905 it is interesting to note the absolute difference of opinion of de Lapersonne who some years earlier stated that at least 5 per cent of sinus inflammations give rise at some period to some ocular manifestation. Again Syndactilis writing only a few years later in the *Alutsche Monatshefte fuer Augenheilkunde* clearly shows that the cause of from 7 to 10 per cent of headaches for which an oculist is consulted, is to be found in the accessory nasal sinuses. One would not as an oculist avoid or elude the statement that has been made that a definite diagnosis of an obscure condition in the sphenoid or in the posterior ethmoid cells has to be determined very largely if not altogether by the ophthalmologist. To quote a case in point:

"A young woman of good health and habits consulted me for the relief of headache and pain behind the right eye. The history of onset and subsequent course were simple enough in that the condition was monocular had no association with application to close work being quite severe at night and that it followed a severe cold in the head. The patient was referred to the Royal Victoria Hospital and a standard physical examination obtained. At this time there was a slight perineural swelling, vision was reduced to counting fingers at 2 meters and a central scotoma was definitely positive. In the rhinological department particular attention and interest was taken in the case but in spite of X-ray photographs and other methods of investigation they had to state that clinical manifestations in the case did not warrant operation. There was no polypoidal formation and no evidence of pus. With the persistence of pain the maintained diminution of vision and with a perinuit that has now reached a field of 10 degrees of actual swelling and in spite of repeated examinations in the nose Doctor Hamilton White consented with our cooperation clinically to make an exploratory incision. I need not say that this was most skillfully done. What was found was an intense swelling of the posterior ethmoid cells with very little pain in the posterior nares but without evidence of pus either in these cells or in the sphenoid which was subsequently drained. I may say that thanks to Doc-

tor White my patient has completely recovered she is free from pain her neuritis has entirely subsided without evidence of atrophic change and her visual acuity is normal

When the very close relation between the canal of the optic nerve and the sphenoidal sinus and posterior ethmoid cells is considered the optic nerve disturbances should be easily appreciated. In some cases the process is undoubtedly a toxemia and the highly organized optic nerve fibers to the fovea are the first to suffer which explains the frequency of central scotoma. Toxemic process involving the optic nerve itself may later account for narrowing of the visual field. Could I ask Doctor Luedde how relatively frequently he has been able to establish central scotoma how frequently he has noted a condition of advanced optic neuritis as in the case which I have been privileged to cite and how often it has been his experience that ophthalmoscopic findings have been the dominant factors in the recognition of trouble in the sphenoid or in the posterior ethmoid cells?

Consider the question of toxins or of local infections may I ask how frequently suppuration in the accessory nasal sinuses may be held responsible for uveitis. With the prevalence of ethmoidal disease is it not strange that we should not more frequently come upon cases of uveitis associated with or responsible for this disorder? Is this dissociation due to the fact as Foxy suggests that there may be some controlling mechanism which prevents the ocular circulation from participating in the inflammatory conditions just as there is a control of the intra-ocular circulation which makes it partially independent of the general circulation?

Turning from clinical manifestations to pathological changes arising from disease in the nasopharynx Doctor Luedde emphasizes the query that I have already made that with a vascular and lymphatic circulation practically identical why do not the associated ocular manifestations which he has cited invariably or at least most frequently become established in the presence of suppuration in the sphenoid or in the posterior ethmoidal cells. Is it possibly true that within the orbit and the various branches of the ophthalmic artery the toxins are combated by an unusually rich blood supply?

With Doctor Luedde I feel satisfied that certain pathological manifestations can no more be determined as of nasopharyngeal origin than any local adenitis chronic inflammation or possibly even more acute types can be determined histologically. A macroscopic study of the tissue is frequently equally baffling if by tracing demands are made upon our interpretation of tissue change or cell alteration. It is true that tuberculosis may demonstrate endothelial cells giant cells and caseation with positive tubercle bacilli in the tissues that lies may manifest cells of the Langhans type perivascularitis and changes in or about the vessel walls. But quite frequently any low grade form of inflammation such as that of the teeth appendix prostate gall bladder lower bowel will manifest histological changes which will baffle histological interpretation.

Regarding the effective treatment of orbital infections and the arresting of serious trouble with the eye let us consider the case of the suppurating tear sac. At least 30 per cent of all ulcers of the cornea are associated with and consequently responsible for chronic suppurated disease in the lacrimal sac. An originally more or less benign infection may assume within the sac a virulence of intensity with the micro-organisms formerly did not possess and has now acquired through a suitable habitat blood borne frequent transfer association with micro-organisms of another class. This fact was pointed out years ago by Plant and von Zelewski. What takes place in front of the

inherent tendencies. Any concurrent infection might affect the growth of certain cell arrangement in a manner which we find expressed in the loss or function of a given part.

It would seem a waste of time and words to argue that anyone can prevent congenital deafness. In the literature consanguinity and heredity are given as the two most important clinical factors connected with this unhappy state. It is not quite clear how many other influences affect congenital deafness. After malformations, consanguinity and heredity, the next cause usually mentioned is syphilis. We know that syphilis in the mother may cause deafness in the child; the eighth nerve is often involved.

There are many other diseases of an infectious nature that probably produce malformations in the internal ear. Any malformations of the child can be most readily explained by the fact that the corrective influence of the placenta failed to protect the embryo from the infection of the mother when the embryo had become infected; the placenta failed to correct the slight damage, and this damage later showed itself as a malformation, possibly due to an injury to the embryonic cells while they were at work creating the internal auditory mechanism. Hence the prenatal care of mothers in the early stage of pregnancy is most essential.

It is conceivable that when the knowledge of obstetrics has advanced to the point where people have the wisdom to protect the environment of the embryo, it will come through a conviction that malformations arise from the limited infections from which the placenta fails to protect the cells of the embryo. The more severe infections destroy the fetus and sometimes the mother.

Wall with his successor Streeter and their associates under the Carnegie Institute Department of Embryology have examined many specimens of embryo, and many that are pathological. They find that of those in the first month of gestation one fifth are normal; in the second month only one half; while in the third and fourth months eight ninths are normal. They think that malformations or monstrosities in the newborn are the result of some localized anomaly which

occurred in the early development yet was not sufficient to cause death and abortion.

It is not difficult to suggest the plan which humanity might adopt to bring greater safety and a more perfect physical development, but human beings as a whole will not avail themselves of our advice yet slowly the trend of protection and prevention is upward. For a long time—yet to come—there will be need for all the help which can be rendered to the deaf and it is interesting that at this time psychologists are contributing their aid adding vibratory methods to broaden the education of those unfortunates. Papers of much interest have been written upon the compensations of the deaf and with Shakespeare we can say 'None can be called deformed but the unkind.' However for the majority of people deafness is a calamity. The loss to the nation and the individual from deafness and ear diseases is stupendous. It is claimed that nearly all deafness is preventable. To make progress in the prevention of deafness would be a great step forward and it cannot be done without the otologist's interest and leadership.

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DISCUSSION

DR. J. M. WAUGH, Cleveland, Ohio: Doctor Cary deals with deafness prevention in a most interesting manner. That the subject is of tremendous economic and sociological importance to the individual afflicted as well as to the Nation is evidenced by the statistics submitted by the author to the effect that in the United States alone more than one million people are hard of hearing, and of these 15 per cent or 150,000 are deaf and dumb.

That 8,500,000 or 8.5 per cent of this number owe their disability to diseases of the middle ear is generally conceded. Fully 90 per cent of these middle ear conditions originate in acute inflammations of the nose, throat, and accessory nasal sinuses. Our specialty can be justly proud of its accomplishment in having popularized the tonsil and adenoid

UNILATERAL ATROPHIC OPTIC NEURITIS¹

BY WILLIAM THORNWALL DAVIS M D WASHINGTON

THE majority of cases of unilateral atrophic optic neuritis result from skull injury, direct injury of the nerve itself local inflammation of the orbit brain tumor and hæmorrhage into the nerve sheath. The etiology of 60 per cent of the cases remains unsolved.

Gunn observes that from the embryological development and structure the optic nerve is to be considered as part of the central nervous system.

The sheaths of the optic nerve and the spaces between them are continuous with those of the brain. This continuity is of pathological importance. The situation of the optic nerves and commissure at the base of the brain renders them liable to involvement in basal meningitis pressure from new growths aneurism or a distended third ventricle. After its entrance into the optic canal the optic nerve has all the exposures of a peripheral nerve. In the canal it may be pressed upon by a diseased ophthalmic artery it may be involved by a syphilitic affection of the bone and from sinus disease particularly sphenoid or ethmoid. It may be injured in fractures of the base of the skull of the orbit or of the foramen or by the plastic exudate caused by such fracture. There is a strong analogy between inflammations of the optic nerve and the facial nerve in the passage of the latter through the wall of the skull.

The dural sheath within the canal is intimately applied to the pia sheath though not so closely but that fluid may pass. When a meningitis occurs these spaces may be closed in only one of the nerves and this would have an important bearing on the possibility of unilateral papilloedema developing as a result of increased intracranial pressure.

In the orbit the nerve may be inflamed along with the other tissues as a result of orbital cellulitis or facial erysipelas. It may be injured in orbital wounds or pressed upon by tumors or hæmorrhage into the sheath.

At its termination the papilla the nerve may suffer from a secondary atrophy due to a papillitic degeneration or a cutting off of the blood supply. Continuously increased intraocular tension may affect it.

At its passage through the lamina cribrosa the fibers may be strangulated by pressure due to swelling of the fibre either of the nerve bundles or of the fibers of the lamina.

There may be inflammation and degeneration of the nerve fibers secondary to destruction of the ganglion cells in the retina from reduced blood supply as in obstruction of the central vessels or retinal detachment from toxic materials such as alcohol tobacco carbon bisulphide etc acting directly upon these cells or from heredity influences such as amaurotic family idiocy.

What Jackson says of the classification of atrophy may well be applied to neuritis. That we have at present no satisfactory system of classification is obvious. No pathological classification is possible owing to our lack of knowledge of the earliest stage of this process.

Neuritis and atrophy are always a result of antecedent morbid processes. Atrophy is an organic degenerative change marked by shrinking with loss of characteristic structure and function. It is the end result of many morbid processes. In the optic nerve we have within the neural sheath the fibers axis cylinders and medullary sheaths the glial supporting tissue and the connective tissue septa dividing the nerve into its chief bundles carrying the blood vessels with their various coats and contents. It is conceivable that any one of these histological constituents might be the starting point of the change in optic neuritis and atrophy. The anatomical and physiological unit of the nervous system is considered to be the axone and hence the pathological change of neuritic atrophy may be outside the nerve stem. Hence our present classification rests mostly on etiology.

Of intracranial tumors those of the middle fossa of the skull are more apt to cause a unilateral papillitis.

Optic neuritis is present in 100 per cent of tumors in the corpora quadrigemina and 80 per cent of cerebellar tumors. In the majority of such cases it is unilateral. Horsley holds that the neuritis when bilateral is more pronounced on the side of the lesion.

Subtentorial abscesses are more frequently accompanied by neuritis than abscesses in the cerebrum. Growths or abscesses in the cerebellum or corpora quadrigemina or intraventricular tumors bring about closure of the foramina producing an internal hydrocephalus. The foramina of Magendie and Luschka may become occluded by lymph or be closed by scar tissue resulting from meningitis. The production of

inherent tendencies. Any concurrent infection might affect the growth of certain cell arrangement in a manner which we find expressed in the loss or function of a given part.

It would seem a waste of time and words to argue that anyone can prevent congenital deafness. In the literature consanguinity and heredity are given as the two most important clinical factors connected with this unhappy state. It is not quite clear how many other influences affect congenital deafness. After malformations, consanguinity and heredity, the next cause usually mentioned is syphilis. We know that syphilis in the mother may cause deafness in the child, the eighth nerve is often involved.

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That 850,000 or 85 per cent of this number owe their disability to diseases of the middle ear is generally conceded. Fully 90 per cent of these middle ear conditions originate in acute inflammations of the nose, throat, and accessory nasal sinuses. Our specialty can be justly proud of its accomplishment in having popularized the tonsil and adenoid

These fractures are not often accompanied by the classic symptoms of basal skull fractures

In some cases of injury to the spinal cord there may be a low grade optic neuritis but only if the cervical cord is involved. No ocular disturbance is below the second dorsal segment

In multiple sclerosis retrobulbar neuritis is a not uncommon complication. It is *not* rapid in its development and the central defect is limited in extent. It is frequently unilateral and pursues an irregular course. It rarely causes complete blindness. The sclerotic deposits are found particularly in the region of the central retinal vessels within the intracranial segment of the nerve and in the chiasm. The most important histological changes are in the nerve fibers neuroglia and blood vessels

Amenorrhœa and a papillitis may run a parallel course both being due to brain disease

Branner reports a case of unilateral atrophy following exposure to an arc light while Fisher mentions a unilateral case resulting from an injection of lanolin and olive oil for wrinkles. Neuritic atrophy may complicate polyneuritis

The neuritis seen in lethargic encephalitis is due in the majority of cases to the internal hydrocephalus and consequent increased intracranial pressure

Albrecht maintains that choked disc may appear in tetany due to decrease in the calcium salts in the blood and brain with resulting cerebral edema

A choked disc following otitic disease indicates intracranial complications as brain abscess or sinus phlebitis

In alcoholic polyneuritis optic neuritis is exceedingly rare it may be unilateral mild or severe and the third sixth and seventh nerves are often involved. Rarely Argyll Robertson pupils may be present

Mercury lead and other heavy metals may produce a polyneuritis with optic neuritis as also may the acute infectious diseases influenza particularly Benbeni leprosy tuberculosis carcinoma and gonorrhœa may be so complicated

Tedeschi reports one case complicating infantile paralysis. In pseudo bulbar paralysis eye symptoms are rare but when present consist of optic neuritis and atrophy

Templeton suggests that optic neuritis occurring early in acquired syphilis should be regarded as an evidence of widespread involvement of the central nervous system in the form of a syphilitic meningitis

Perineuritis is an inflammation of the sheath of the optic nerve with exudation into the subaginal

space. Among the causes may be particularly mentioned meningitis gonorrhœa orbital abscess orbital traumatism and parotitis

In direct injury to the optic nerve there is immediate blindness followed by descending atrophy a traumatism of less degree results in neuritis or choked disc followed by atrophy

Cammer and McClintock report two such cases of direct injury one due to penetration of the orbit with a fencing foil followed by immediate blindness the other due to a thrown table fork penetrating the orbit followed by blurring and whitening of the disc. Such injuries are apt to be committed by agents like the ferrule of an umbrella flying pieces of steel glass or small caliber bullet. These may injure the nerve or its sheath or there may be pressure from a clot in the orbit within the sheath or in the optic foramen or injury to the nerve from the results of a fracture

Primary tumors of the nerve are rare some have the structure of endotheliomata and spring from the dural sheath

Fibromata sarcomata and myxomata which spring from the subarachnoid trabecular pial sheath or septa thereof or the glial tissue of the nerve have a common character being a manifestation of neurofibromatosis. Early blindness is a common characteristic with first a neuritis followed by atrophy later there is exophthalmos and interference in mobility etc. One case was reported by Ellett in which the fundus appeared normal

Unilateral optic neuritis atrophy with hemiplegia on the opposite side of the body is probably due to thrombosis of the cavernous portion of the internal carotid artery. If there is an extension of the thrombosis or formation of an embolus the ophthalmic artery will become occluded

McCallum director of Egyptian Hospitals made the following classification of optic atrophy

- 1 Primary as in spinal or vascular disease
- 2 The result of retrobulbar neuritis
- 3 Postneuritis atrophy
- 4 The result of disease of the retina and choroid
- 5 After compression or injury of the nerve
- 6 Unknown causes

Of this classification those conditions included under (1) vascular disease (4) unilateral retinal or choroidal disease (5) after compression and injury of the nerve are apt to cause unilateral neuritis with atrophy

Axenfeld discussing cerebrospinal meningitis remarks that pressure of the exudate upon the base of the brain particularly in the neighborhood of the optic foramen causes at times optic

CONDITIONS OF THE EYEBALL ARISING FROM RHINOPHARYNGEAL DISEASE¹

By WILLIAM H. LUEDE, M.D., F.A.C.S., St. Louis

THE literature concerning conditions of the eyeball arising from rhinopharyngeal disease has become so extensive that the recital of a catalog of titles and authors could easily absorb all the time available for this presentation. Evidently these complications are not unusual, however, from the first there has been a wide difference in published opinions about their relative frequency.

Thirty years ago in a standard ophthalmic textbook by Noyes (15) the only mention of any relation between the nasopharynx and eye except conditions involving the nasal duct referred to a physician who had accommodative asthenopia which seemed to be much aggravated by nasal catarrh.

Zuckerkindl (1882) and Weichselbaum (1885) on the basis of pathological conditions and anatomical relations pointed to the possible connections between sphenoidal sinus inflammations and the orbito-ocular system. Berger and Tyrmann (1886) discussed the complex clinical manifestations. Among pioneer rhinologists Hajek (1904) commented on the infrequency of ocular symptoms. Among early ophthalmic writers Fuchs referred to the rarity of ocular disease of nasal origin and to the impossibility of a positive diagnosis during the life of the patient. Moreau (1905) reported that among 820 patients suffering from sphenoidal sinusitis not one showed ocular lesions. On the other hand de Lapersonne (1898) estimated that at least 5 per cent of sinus inflammation gave rise at some period to some ocular manifestation and Berthemes (1900) stated that suppuration of the sphenoid was rather more often discovered by the oculist than by the rhinologist. Then came the convincing presentation of Onodi (1905) showing beyond question the relation of infection of the ethmoid and sphenoid to ocular disease.

The last three decades have greatly expanded our knowledge and experience in this field. So recent has been its development that the distinguished leaders who brought it about are our own teachers or colleagues. Civic pride and personal friendship compel me to name at least two of them: Greenfield Sclader and Hanau. W. Loeb. Conditions of the eyeball related to nasopharyngeal disease are naturally divided into two

primary groups: external and internal. The latter group may be further divided into (a) disordered ocular functions without demonstrable organic changes and (b) pathological changes in the ocular tissues.

It may not be possible to classify every case with absolute precision but some sort of an outline permits a better understanding of the relations between diseases of the nose, throat and eyes than can be gained from a chaotic presentation of clinical experiences. No doubt we all agree with Rollet who writes that the special interest in this question lies in the interpretation of the cause of these phenomena (*l'interet de la question reside specialement dans l'interpretation de la cause de ces phenomenes*).

CONDITIONS OF THE EYEBALL RELATED TO DISORDERED OCULAR FUNCTIONS

The principal functions of the eyeball are retinal perception and focal adjustment. As causes for ocular disorders of purely functional type we may enumerate (1) retrobulbar pressure, (2) reflex nerve impulses, (3) vasomotor disturbance and (4) toxins.

Retrobulbar pressure. The function of vision is lost or impaired if there is anything to interfere with proper transmission of retinal impressions to the brain via the optic nerve, etc. The common everyday experience of a foot gone to sleep shows us how simple pressure upon a sensory nerve may inhibit its function. The optic nerve passes through the short but narrow optic canal in most intimate anatomical relation to the posterior ethmoidal and sphenoidal sinuses. Hence inflammations involving these sinuses may produce direct pressure upon the optic nerve through defects in the optic canal or by secondary swelling of the periosteum within the canal sufficient to suspend the function of seeing for a variable period. In these cases there need be no abnormal appearance of the ocular tissues either externally or on ophthalmoscopic inspection; just a foot that has gone to sleep appears natural in every way.

The first and most impressive example of the functional loss of vision caused by nasal sinus disease in my experience was encountered 20 years ago.

CÆSAREAN SECTION FOLLOWED BY TEMPORARY EXTERIORIZATION OF THE UTERUS

THE PORTES OPERATION¹

By LOUIS E. PORTES, MD, FACS, Boston

CÆSAREAN section followed by temporary exteriorization of the uterus was first done by Dr. Louis Portes at the Maternité de Port Royal de Paris, on the service of Dr. Demelin December 14, 1923. The first case was reported to the *Société d'Obstétrique et de Gynécologie de Paris* at its meeting of March 10, 1924. Since the first case was reported a number of these operations have been done in France.

The method does not enter into competition with the conservative cæsarean section, be it classical or low cervical, but it is of value in neglected cases in which it would be hazardous to undertake the latter methods. It therefore is never considered in clean or relatively clean cases. The low or cervical cæsarean section has its greatest advantages in the clean or the presumably infected case but does not offer the same degree of safety that does the Portes operation in the frankly infected or hopelessly neglected case in which an indication for abdominal delivery arises. It is therefore never an operation of choice but one of necessity.

Its largest field of usefulness is represented under four conditions:

1. When frank infection is present, the child is living, and the condition of the pelvis is such that abdominal delivery is indicated.

In the presence of infection and of a dead child when delivery by the natural passage if not impossible is at least fraught with danger.

3. When any maneuver through the birth canal might result in the rupture of the uterus. The operation is indicated in such a case even though the child is dead. This applies especially in the neglected labor case with marked uterine retraction. In this type of case it is safer than craniotomy on a dead child or even embryotomy, as either of these procedures performed within a retracted uterus may well lead to rupture.

4. In the presence of a pelvic indication for abdominal delivery with fetal putrefaction and grave maternal infection.

It is a known fact that a woman subjected to long labor and repeated attempts at delivery is a poor risk for an extensive abdominal operation, and yet most authors agree that in that type of case the cæsarean section should be followed by hysterectomy because of the greater safety afforded by this procedure. The hysterectomy is often done at the worst possible time, the patient being in a state of shock. In surgery the poor risk is more and more frequently being operated on in two stages and there is no reason why the obstetrical patient should not receive the benefit of this advance in surgery.

The Portes operation, the technique of which follows, is done in two stages. The first stage consists in making a long abdominal incision, delivering the pregnant uterus, closing the abdominal wall behind it to the cervix, making a high uterine incision, extracting the child, placenta, and membranes, closing the uterine incision and allowing the uterus to remain on the abdomen. This part of the operation is rapid and results in but little shock.

As far as the second stage is concerned, two methods may be used. First, if the patient does well, involution of the uterus is allowed to take place and when the uterus is clean and the uterine incision well healed the abdominal incision is re-opened and the uterus and adnexa are replaced in the pelvic cavity. Drainage is placed behind the uterus and the abdominal wall is closed. If on the other hand the sepsis seems uncontrollable, a hysterectomy may be performed extra-abdominally following the Porro technique after the state of shock has passed. This was done successfully in one case with the patient in bed without anesthesia. At the February 9, 1925 meeting of the *Société d'Obstétrique et*

the nasal disease. Proper nasal treatment was followed by a striking improvement in eyesight even before the surgical elimination of the lateral sinus disease brought complete permanent restoration of function.

We have therefore the possibility of a functional impairment of eyesight due to postethmoidal or sphenoidal disease without organic pathological changes. The condition is more frequently one sided but may be bilateral. A localized penneunitis of that portion of the optic nerve lying within the bony canal has been suggested by Berger as an explanation. In that event there is almost certain to be some organic demonstrable pathological change in the optic nerve. It seems more reasonable to assume that these functional disorders of vision are merely secondary to pressure exerted on the optic nerve.

Reflex nerve impulses vasomotor disturbance and toxins. It is often difficult to distinguish between the three other causes of disordered ocular functions. These causes must therefore be discussed all together.

Among the disorders of ocular function of reflex nasopharyngeal origin the following conditions have been named: photophobia, conjunctival hyperæmia, blepharospasm, lacrymation, general or local ocular pain, *muscæ volitantes*, scintillating scotoma, accommodative asthenopia, painful accommodation changes in the visual field, keratoconjunctivitis, neuroparalytic keratitis, mydriasis or myosis and variations in intraocular pressure. According to accumulated experience it seems more and more improbable that all of these disturbances ordinarily originate from simple nasopharyngeal nerve reflexes. Ziem pointed out that sensory or sensual disorders of the eye could not be truly reflex. According to MacLeod a single reflex acting independently of the rest of the nervous system does not really occur. An afferent impulse spreads so as to involve a large variety of motor or excitosecretory neurons, each of which may however be excited through other afferent fibers arriving either from other receptors or from higher nerve centers. To those inclined to doubt the possibility of a reflex from the nose to the eye, Berger proposed the simple test of pulling the fine hairs in either nostril and noting how quickly lacrymation begins on the same side. Berg r insisted that neuralgic affections of the trigeminus of nasal or dental origin may give rise to trophic disturbances in its ophthalmic branch shown by herpes corneæ, etc. Panas and Parinaud accepted reflex action only as an explanation for transient functional ocular disorder.

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Investigations of Sluder, Berger and others demonstrate that intraocular pressure may be influenced by nasal conditions. In patients under my observation intraocular tension in simple chronic glaucoma has been reduced temporarily and the pain of acute glaucoma has been markedly lessened by local anæsthesia of Meckel's ganglion. These effects were too uncertain and transient to be incorporated in the routine treatment of the disease. However they suggest the possibility of far reaching ocular effects from nasal treatment. It was assumed that this effect might reach the eye by the way of a branch from Meckel's ganglion to the ciliary ganglion controlling intraocular secretion. But recent opinion (Whitnall) seems to be conclusive that the ciliary ganglion has no influence on intraocular secretion of fluids or tension.

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questioned but it has been proved that a woman with a uterus which has been exteriorized and returned to the pelvic cavity may conceive and carry a pregnancy to term as shown by the following observation

At the July 5 1926 meeting of the *Société d'Obstétrique et de Gynécologie de Paris* Professor A. Couvelaire reported the case of a woman having previously been delivered by the *Portes operation* who successfully carried a pregnancy to term. The *Portes operation* was performed on July 18 1924 and the parturient was delivered of a male child weighing 7 4 pounds (3,430 grams). The uterus was returned to the abdominal cavity on August 2 1924 it having been extruded for 15 days. She left the maternity hospital on August 16, 1924 with her child and resumed her occupation of housewife. The second pregnancy evolved normally. She started in labor late on July 4 1926 and early on July 5 1926 she was delivered at the Baudelocque Clinic by Dr. Portes, by a classical cesarean section. The child was alive and weighed 7 1 pounds (3,250 grams). There were only a few omental adhesions to the abdominal wall, the uterus was free and without adhesions and the uterine scar was good.¹

I am indebted to Professor Couvelaire and to Dr. Portes for the privilege of seeing this woman and her child at the Baudelocque Clinic on the day of her delivery July 5 1926.

Since the publication of the original operation of Dr. Portes I have been able to collect the details of 16 cases from the French literature. They are grouped in tabular form for the sake of convenience.

TECHNIQUE OF OPERATION

General anesthesia is used and the operation performed in two stages.

First stage. The patient is given a general anesthetic and the abdomen opened by an incision extending from slightly above the symphysis pubis to the xiphoid cartilage. The pregnant uterus is delivered covered with sterile moist towels and turned toward the symphysis pubis. The traction on the uterus should not be too great. The abdominal wall is closed in one layer behind the uterus down

to the cervix with double silkworm gut stay sutures hooked with small rubber tubing. (In France they use silver or bronze wire.) The closed abdominal wall is then covered with a sterile towel the uterus is dropped on it and wicks are carefully placed around the cervix to prevent leakage in the abdominal cavity. A high midline incision encroaching upon the fundus of the uterus is made. The low angle of the incision should not be too low so that it will not pull down in the abdominal cavity when involution of the uterus has taken place. The child, placenta, and membranes are extracted and the uterus is sutured in two layers with No. 2 chromic catgut the first interrupted and the second continuous. (In France they use silk sutures for the deep layer.) The uterus is now covered with dressings and left on the abdomen. A tight abdominal bandage is applied to keep the uterus flat on the abdomen as its ante flexion causes pain.

Second stage. When the uterus is clean and the uterine scar is firm the abdominal incision is re-opened up to about the umbilicus. The adhesions are freed from behind the cervix from the uterovaginal pedicles laterally and from the abdominal wall anteriorly. The uterus is dropped back in the abdominal cavity and a large cigarette drain is introduced into the cul-de-sac of Douglas and allowed to come out of the abdominal wall behind the uterus. The abdominal wall is again closed in one layer with double silkworm gut stay sutures.

REPORT OF CASE

Mrs. B. F. aged 38 a housewife, born in Ireland was admitted to the Carney Hospital on October 17 1926. Her father mother 2 brothers and 4 sisters were living and well the only death in the family being that of a sister who died during infancy, the cause being unknown. The patient had been breast fed she does not remember at what age she walked she had measles and pertussis. A few years ago she was severely burned about the face neck and fore arms. She was treated at the Carney Hospital where she remained for 4 weeks. Her occupation before marriage had been that of chamber maid. Her menstruation was established when she was 14 years of age her periods were regular of the 28 day type and lasted 2 to 3 days the flow was scant there was no pain and no clots were observed. The last period had occurred on January 10 1926. Her confinement was expected for October 17 1926. She was married when she was 22 years of age and had had 3 previous

¹Bull. Soc. d'ob. et d. gynoc. de Pa. 1926 4 3 474.

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Fig. 2. Iones operation. The uterus after involution has taken place and before it is returned to the pelvic cavity. The uterine scar is hardly visible. The abdominal incision is perfectly healed. The tubes and ovaries are lightly edematous but the tubes are patent.

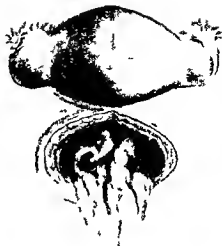


Fig. 3. Portes operation. The abdominal incision is reopened. The intestines are protected with gauze. Intestinal adhesion are exceptional.

Convalescence. *October 18.* The patient made a good recovery from the ether with very little vomiting. Twenty-four hours after the operation no symptoms of shock could be noted; the pulse was 100 and no distention was present.

October 19. There was a slight amount of distention which was relieved by injections of pituitary extract and enemata. The uterus looked clean. The tubes and ovaries were very edematous. The uterus was dressed with sterile gauze impregnated with sterile vaseline.

October 20. The patient had a chill. The urine showed marked cystitis. Alkaline treatment was prescribed with bladder irrigations. The suture line of the uterus showed a very slight serous discharge. There was also superficial sepsis of the abdominal sutures at the lower angle of the incision. There was considerable blood-stained discharge from the vagina. She looked septic but her condition was not alarming.

October 21. She complained of backache, was not relieved by change in position and voided in small amounts.

October 22. The backache was apparently due to a distended bladder. 33 ounces of urine were obtained on catheterization and the backache was completely relieved. There was no change in the appearance of the uterus.

October 23. Frank pus appeared through every stitch hole in the uterus. The vaseline dressings were omitted and Dakin's dressings substituted. The uterus was covered with gauze wicks soaked in Dakin's solution.

October 24. The patient was allowed out of bed in a chair as she was stout and there was beginning irritation of her back. Signs of phlebitis in the right leg appeared. The leg was elevated while she was sitting in a chair. The uterus was about one-fourth the original size.

October 25. The abdominal sutures were removed and the incision was well healed. There was a little irritation from the sutures where they had cut in. The uterus looked much better as a result of the Dakin treatment. There was still pus coming from the suture holes and a foul discharge from the vagina.

November 1. The patient was up a day. Her leg had begun to feel better. She was eating well and her bowels were open. The uterus looked clean in every way except for the draining incision which was still discharging pus through the suture holes but the incision itself had healed firmly. The tubes and ovaries were still edematous but they were apparently not septic. The vaginal discharge had decreased in amount and was less foul. Involution was rapidly taking place.

November 8. The uterine incision had been treated with 1 per cent mercurochrome and the uterus as

conditions are attained by the perfect co-operation of the rhinological and ophthalmic surgeon. The appropriate treatment in any given case must be determined by those in charge. Two fundamental considerations must be the guide—cleanliness and the establishment of drainage.

Destruction of the eyeball may follow by continuity after infection of the orbital tissues originating in the paranasal sinuses. According to Kuhnt, Panas and Rollet the usual clinical sequence is corneal ulceration perforation and panophthalmitis rather than a direct transfer through the scleral barrier into the posterior segment of the eyeball.

Effective treatment of orbital infection usually prevents complications within the eyeball. The course of inflammations of the ocular tissues caused by actual bacterial invasion coming from the nasopharynx by contiguity or metastasis depends on the virulence of the invading organisms. Subsequent treatment of the primary disease in the nasopharynx may then be of little benefit.

Putting out the original fire in a general conflagration may be of little help nevertheless it is usually the right thing to do. Where only smoke and sparks are being blown about putting out the primary blaze will prevent damage to adjoining property. Applied to pathological ocular conditions arising from rhinopharyngeal disease this means the prompt enucleation of infected tonsils or the effective drainage for nasal sinuses by surgical intervention if required unless age or serious constitutional disease creates too great a risk.

Smoke and sparks are represented by the tonsils or attenuated bacteria carried to the ocular tissues by the blood stream and lymph currents from the nasopharynx.

To understand why infections of the nose and throat are not invariably transferred to the ocular tissues we must study the channels of communication. The possibility that bacteria can be conveyed to the ocular tissues by blood vessels has been demonstrated clinically by multiple uveal abscesses in pyæmia and experimentally with special reference to tubercle bacilli by the researches of Stock and Finoff. Proving this possibility does not necessarily establish the probability that it is the usual manner in which bacteria are brought to the ocular tissues. The presence of tubercle bacilli in the blood stream is likely to produce the general miliary type of tuberculous disease in animal experiments as well as in the afflicted human being. Many ocular conditions arising from rhinopharyngeal diseases are purely local and do not appear as manifestations of a general constitutional malady.

It is justifiable therefore to assume that often the transfer is made through lymphatic communications. Bacterial invasion by way of lymphatics is usually beld up and localized by lymph nodes or glands. There are no orbital lymph nodes or glands to separate the lymph channels of the nasopharynx from the orbito-ocular system. Lymphatic communication throughout the nasopharynx is free and ample. Whitnall states

The lymphatics of the orbital cavity are imperfectly known in man. As elsewhere in the body the system no doubt consists of spaces which are pervascular in position. Definite lymph vessels can be demonstrated in the eyelids conjunctiva and lacrimal gland but as regards the orbit itself although Schwalbe and Parsons describe Tenon's capsule as enclosing a definite lymph space lined with endothelium and continuous with a supravaginal space around the optic nerve and others have considered the interlobular spaces of the orbital fat to be likewise lymph channels such intervals do not show any special structural development though like similar spaces elsewhere in the body they may contain plasma from the blood vessels.

Leher who in 1876 denied that the perichoroidal space of the eyeball communicated with the space in Tenon's capsule is supported by Charpy and Hesser who state that the latter is neither a true serous nor a formed lymph cavity. While the manner of entrance of lymph into the eyeball still remains the subject of an unfinished controversy there is general agreement that the lymph passes out of the eye round the anterior ciliary and vorticosc veins and the central vein of the retina and eventually into the jugular lymph trunks. The lymph vessels of the orbit are supposed to pass through the inferior orbital fissure to the internal maxillary nodes and thence to those of the upper deep cervical groups and communications may also exist between the orbital system and that of the nasal cavity or accompany vessels passing through the superior orbital fissure they have not been demonstrated in man.

Careful and persistent study of the problem of lymphatic communications between intra-ocular and extra-ocular tissues by reliable and competent investigators has produced contradictory results. Some find channels of communication freely open others equally trustworthy find them closed. May we not on the basis of general clinical experience conclude that in some patients lymphatic communications are open so that rhinopharyngeal diseases unmistakably do become a cause of ocular complications? On the other hand these communicating channels are often so ob-

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showed no active manifestations of the disease. In at least 1 case of apparent syphilitic optic nerve atrophy I have seen astounding improvement after nasal operation for the drainage of the postethmoid and sphenoid. In others the progress of the atrophy has been arrested. As they had active antiluetic treatment both before and after the nasal intervention there may be some doubt as to the degree of benefit resulting from the nasal treatment.

With reference to ocular tuberculosis some clinical observations indicate direct transmission of the tubercle bacillus or its toxin from the nasopharynx to the eyeball. In a number of cases intra-ocular lesions giving positive focal reactions after a test injection of tuberculin have healed following the eradication of disease in the nasopharynx.

Unmistakable benefit has been noted in the course of sympathetic ophthalmia and in the treatment of incipient retinal detachment after enucleation of infected tonsils. Such cases stimulate further study of etiological relations.

The possibility of ocular inflammation due to rhinopharyngeal disease being conceded it becomes axiomatic that an ophthalmic surgeon must attempt to eliminate such diseases in securing the most favorable conditions for any intra-ocular operation. In a recent case an iridectomy and an Elliot trephining had been done on both eyes for relief from bilateral glaucoma without success. Enucleation of infected tonsils and the elimination of some dental infection was demanded. After this preliminary preparation a subsequent iridectomy was followed by an eminently satisfactory and apparently lasting result.

In closing it becomes necessary to sound a word of warning against the danger of that over-enthusiasm which tries to find in rhinopharyngeal disease sufficient cause for all obscure ocular conditions without completing the diagnostic study by a careful search for any other etiological factor. Years ago the importance of rhinopharyngeal disease was sometimes overlooked as is painfully evident in the following case history.

Mrs. R. N. J., age 17 years, first examined December 18, 1911, presents a double optic atrophy. Examination by the local eye, ear, nose and throat specialist of her city was confined entirely to the eyes which showed bilateral optic neuritis. She was referred to a distinguished surgeon of the middle west. After neurological consultation and confirmation of the ocular condition by another ophthalmologist a bilateral temporal decompression was done as there were no localizing symptoms for an intracranial lesion. It was assumed that there could be no other cause for the ophthalmoscopic picture. It was hoped that cranial decompression would stop the headaches and prevent further loss of vision. This hope was not realized for

vision failed rapidly and the headaches continued unchanged. Both for relief from the latter and in the hope that some sight might be restored the patient had been brought to St. Louis. A nasal examination not having been made nor even suggested throughout the course of the case it was urgently recommended. Dr. Sluder discovered a double sphenoidal empyema, the treatment of which gave immediate permanent relief from the headaches and a perceptible improvement in light perception and projection. The advanced optic atrophy precluded further improvement of vision. A subsequent neurological examination by Dr. Unterberg of St. Louis failed to show any sign of an intracranial lesion, nor has there been any evidence of it in the past 15 years.

The failure to consider a rhinological etiology was a mistake but can be justified by excellent authority. Bilateral optic neuritis due to nasal sinus disease had been considered impossible. Kollet referring to optic nerve disease of nasal origin states: *la lésion du nerf optique quand elle emprunte l'aspect ophtalmoscopique d'une papillite simple ou oedémateuse, est toujours unilatérale*.

I have encountered only one other case of bilateral optic neuritis, typical choked discs due to nasal sinusitis.

Mrs. G. L. White, age 47, February 24, 1915, was given a careful general examination at the St. Louis University Hospital (St. Mary's) and showed no sign of intracranial disease. Complete recovery of vision and comfort followed bilateral drainage of the postethmoidal and sphenoidal sinuses by Dr. H. W. Loeb.

Both of these patients are alive although one of them is blind. But the other side of the picture is more serious. In the last 2 years I have seen 2 cases of bilateral optic neuritis in both of which neurological and ophthalmoscopic examinations were not made until it was too late to save life. Both were taken to Class A hospitals but these important examinations were put off as mere details because the physicians in charge of these cases were satisfied to rest with the discovery of nasal sinusitis. Months of time were thus wasted. In the first case the brain literally exploded and a fragment spurted across the operating room when cranial decompression was at last attempted after operation on the sphenoidal sinuses had proved to be an utter failure. The last patient died from respiratory paralysis 3 days after the ophthalmoscopic examination and before the neurological examination was completed. Both cases showed other signs of intracranial disease.

Therefore lest we forget—let us repeat that there is no short cut to a diagnosis the whole patient must be studied.

DISCUSSION

DR. FREDERICK TOOLE, Montreal: I esteem it a personal as well as a professional privilege to open the discussion.

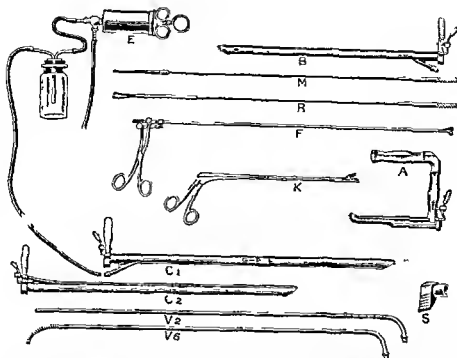


FIG. 1. Peroral endoscopic instruments. A direct laryngoscope. B bronchoscope. C and C₂ esophagoscopes with a pirating canal. C₁ is preferable for general use. F portable aspirator with positive pressure for clearing canal when necessary an electric pirating pump is preferable especially if it has a positive pressure tubal connection. H esophagoscopic bougie for safe dilatation under guidance of the eye. R sponge carrier for gauze sponges the latter are not shown but are absolutely essential—at least 4 dozen of the proper size for each size of tube to be used should be in readiness on the sterile table. F bronchoscopic and esophagoscopic forceps. A laryngeal forceps for taking specimens of tissue a longer form of this forceps is needed for bronchoscopic and esophagoscopic use. I a pirating tube. L a spiral-tipped pirating tube (Lynch). S Moore thumb bite block.

to the skillful insertion of a bronchoscope or esophagoscope. Taking all the cases as they come those with essentially fatal visceral diseases such as mediastinal lymphosarcoma advanced cancer etc. as well as those presenting difficult mechanical problems of foreign body extraction or foreign body pathology the mortality taken over a period of 10 years is not over 17 per cent. In 1906 at the Chevalier Jackson Clinics there were 4656 peroral endoscopies done by 8 individual members of the personnel and course graduates. During this period there was but one death shortly after bronchoscopy and in this case there was no autopsic evidence to indicate that death was directly or indirectly attributable to the endoscopy.

PREPARATION OF THE PATIENT

Except in utmost emergency it is essential that every patient be carefully not casually gone over

by an internist or pediatrician (1). High blood pressure advanced cardiovascular disease aneurysm active syphilis or tuberculosis and other serious organic diseases do not necessarily forbid endoscopy but it is essential that they be taken into consideration in the preparation of the patient. For this reason careful roentgen ray examination would be absolutely essential in every case as part of the preparation even if it were not an essential element in the diagnosis. It is essential that the stomach be empty of food notwithstanding the fact that a general anesthetic is not to be used. The contact of the instruments with the fauces and base of the tongue will cause retching which is of no consequence if there is no food in the stomach. The stomach is never absolutely empty of secretions (3). In cases of esophageal stenosis the esophagus should be washed out and well drained.

etc may equally well occur behind it. With the removal of a tear sac an ethmoid and the drainage of a sphenoid or more remotely still the enucleation of a tonsil each possibly harboring, let us say a pneumococcus infection one is at least smothering the fire before the rest of the structure or the adjoining buildings have burst into flames.

Doctor Luedde has sounded a note of warning toward the close of his paper not only regarding the importance of the early establishment of an associated diagnosis but also regarding the importance of early surgical interference. For we must surely appreciate that from the nasopharynx as from many other foci septic processes may originate a generalized arthritis of common character as of common origin to the eye condition and which may long after the originally septic focus has been detected and eradicated continue to maintain a chronic form of virulence through the blood stream.

I am sure that Doctor Luedde agrees that with the better understanding of the relationship between ocular and nasal disorders there has developed a need for a broader knowledge of nasal surgery and of the necessity of surgical interference on the part of the ophthalmologist. The ophthalmologist may not feel competent to undertake these surgical measures granted that he has particular facilities for clinical interpretation not in the possession of the rhinologist. Though unable to undertake these surgical measures he should at least be thoroughly familiar with the surgical anatomy of the nose and of the accessory nasal sinuses. He should be called upon with increasing frequency as a consultant in operations to be undertaken in this region and should take part in the operations upon his own cases which his increasing knowledge of the subject will lead him to refer to the nasal surgeon for operation.

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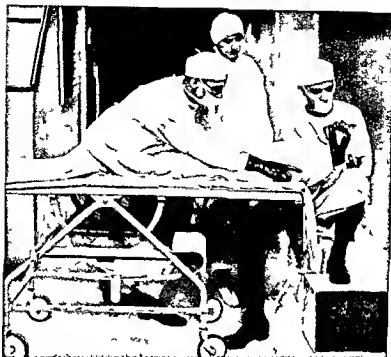


Fig. 4 Position of patient and assistants for introduction of the bronchoscope and esophagoscope. The middle of the scapula rests on the edge of the table; the head and shoulders, free to move, are supported by the assistant whose right arm passes under the neck; the right middle finger inserts the bite block into the left side of the patient's mouth. The left hand, resting on the left knee, maintains the desired degree of elevation, extension and lateral deflection required by the operator. The left hand is often required to be so high that only the elbow rests on the knee. The patient's vertex should be 10 centimeters higher than the level of the top of the table. It is essential for the assistant to have constantly in mind that the right forearm must not support the neck; all the support must be of the head only and must come from the left hand. This is the Boyce position, which has never been improved upon for bronchoscopy and esophagoscopy, but for satisfactory results every detail must be precisely adhered to. The assistant holding the head is purposely posed in black clothes to emphasize by contrast the position of the legs. Precisely this position is of utmost importance and drill is necessary before it can be assumed promptly in emergencies and maintained comfortably for a long time when necessary. The foot rest is a box 10 by 12 by 14 inches to give choice of height with stability.

internal hydrocephalus produces increased intracranial pressure which causes collapse of the delicate cerebral veins and consequently a decrease in the cerebrospinal fluid absorption. Likewise this increased pressure tends to drive the cerebrospinal fluid into the sheath of the optic nerve. When there are adhesions of the sheath due to previous meningitis there will be unilateral papilloedema.

Among the affections of the brain other than tumor that may cause optic neuritis are foci of softening, sinus thrombosis, aneurism, cerebral hæmorrhage and cysts.

In children the most frequent causes of optic neuritis are chronic meningitis, hydrocephalus and tubercles.

A malformed skull as tower skull is a frequent cause of optic neuritis. It is a rare complication in certain spinal diseases such as acute myelitis, tetany and multiple neuritis.

According to Fuchs the only cases of optic neuritis that may be designated as purely local are those due to orbital affections such as inflammation, new growths or tumors on the optic nerve itself. There may be a slight papillitis associated with retinitis stellata. The latter may be unilateral and is most frequently seen in youth.

In thrombosis of the superior longitudinal sinus which may occur in chlorosis, typhoid or marasmus, the papilloedema which may be unilateral is thought to be due to occlusion of the main channel for the discharge of the surplus cerebrospinal fluid.

Skull fractures cause a large percentage of unilateral optic neuritis cases, particularly fractures involving the base of the skull or the bones of the orbit. Blows on the head in the neighborhood of the supra-orbital foramen are apt to cause fracture of the supra-orbital plate or a perostitis in the neighborhood of the optic foramen.

Often in head injuries, particularly in this neighborhood, there will be a neuritic atrophy without demonstrable fracture; there is probably a line fracture in the neighborhood of the optic foramen.

Indirect injury to the nerve itself may be caused by a blow on the external angular process without other demonstrable lesion. The primary impairment of vision and loss of the temporal field may be followed by atrophy.

In these cases of indirect injury we are dealing with indirect fractures of the walls and particularly the upper wall of the orbit, the fractures being continued into the optic canal so that the nerve is crushed or lacerated. Such injuries may

cause subdural hæmorrhage compressing the nerve.

Pringle thinks that monocular blindness from diffuse violence to the skull is in the majority of cases due to hæmorrhage into the nerve sheath. He quotes a series of 395 skull fractures treated at the royal infirmary; 186 patients recovered, 1 patient suffering loss of vision in 1 eye. Of the 209 that died, necropsy was done on 174; of these 13 showed fracture involving the optic foramen, 16 showed hæmorrhage into the sheath of the optic nerve.

The hæmorrhage may be from one of three sources: (1) the subdural space, (2) rupture of the vessels passing between the nerve and its coverings, or (3) the central vessels of the retina which run a short distance inside the dural sheath before they enter the substance of the nerve. The hæmorrhage begins at the distal extremity of the nerve close to its entrance into the eye.

There is no reason to doubt that an intravaginal hæmorrhage of the optic nerve may result from violence to the skull without a fracture as a result of the varying tensions produced in the tissues of the orbit and cranium by the violence. The loss of vision in this type of case is due to (1) effusion of blood, (2) depressed bone compressing the nerve, or (3) direct injury to the nerve itself.

Pringle operated in 3 typical cases of this kind when there was no demonstrable fracture in the hope of saving vision. Blood under tension was found in the optic nerve sheath. These patients came to operation 2 to 4 weeks after the injury. There was no restoration of vision but this may have been due to the lateness of the operation.

Bray reports a case of unilateral atrophy in a child of 4 years following fracture of the base of the frontal bone. In adults such atrophy is not uncommon but it is rare in children.

Instrumental delivery is undoubtedly one of the frequent causes of neuritic atrophy in children. Frequently it is not discovered until an amblyopia is noted in an examination later in life. It may be discovered accidentally.

Widky reports a case of atrophy following a right supra-orbital injury producing a short period of unconsciousness. On regaining consciousness the patient found he was blind in the right eye. Such cases were formerly referred to as supra-orbital amaurosis.

Thorl collected 268 cases of lesions of the visual apparatus following skull fractures, of which 25 affected the optic nerve. He notes that a blow upon the frontal eminence or the external orbital process can produce a fissure of the vault of the orbit which will radiate into the optic canal.

2 centimeters in an adult. Then a powerful lifting motion sufficient to sustain the weight of the patient's head is imparted to the laryngoscope in the direction of the dart shown at *Figure 6*. At this point particular care to keep the patient's shoulders down on the table is necessary. Prying on the upper teeth as a fulcrum must be avoided. The patient not being anesthetized there will be no glottic choke until he takes a deep breath. If the patient is 3 years of age or over he is told to take a deep breath. If he is under that age he will soon do so without being told (9).

It is absolutely essential that the laryngoscope be held in the left hand and that the use of the instrument never be attempted even once with the right hand to do so would give the operator a false start that would be a handicap. It is easier to expose the larynx with the left hand than with the right even for right handed persons. It requires no higher degree of ambidexterity to do bronchoscopy than to use the knife and fork in eating. As in any department of surgery the bronchoscopist will develop the lame duck (left hand) to the greatest possible degree and no matter how great the degree of ambidexterity developed he will at times wish he had a third or even a fourth hand.

Introduction of the bronchoscope. The bronchoscope can be quickly and safely introduced without any difficulty after the larynx is properly exposed with the laryngoscope held in the left hand. General anesthesia is not necessary and is dangerous in dyspneic patients. Cocaine is dangerous and quite unnecessary in children but is generally used in adults. Morphine in full doses may be given to either adults or children (2) and should be administered hypodermically at least an hour and a half beforehand. The patient must be in the position shown in *Figures 4 and 5* and the operator should stand up as shown in *Figure 5* until the distal end of the bronchoscope is in the trachea (*D Fig 6*). Later the operator may sit on a high or low stool as necessary to present a lumen image.

Once the vocal cords are exposed with the direct laryngoscope held in the left hand as described under the heading direct laryngoscopy the insertion of the bronchoscope is easy. Before the bronchoscope is inserted a gauze sponge moistened with a 10 per cent solution of cocaine (in adults only) may be passed between the cords and down to the bifurcation and held there for a minute or two. The bronchoscope illuminated with its own lamp should be passed to the operator in exactly the proper position for insertion (point forward handle to the right). The operator after in-

serting the bronchoscope in the laryngoscope transfers his eye to the bronchoscope and making sure of the presentation of the vocal cords insinuates the slanted end of the bronchoscope carefully between them with a slightly rotary motion. The exploration of the tracheobronchial tree is a matter of following the lumen and is greatly facilitated by the position above described which leaves the head of the patient free to be moved about widely in every direction. Though the operator must be standing at the start (*Fig 5*) following the lumen after introduction (*D Fig 6*) usually requires the operator to sit. To expose anterior branches such as the middle lobe bronchus or the anterior branches of the left upper lobe bronchus requires lowering of the patient's head and a low position for the operator.

BRONCHOSCOPY FOR DISEASE

Diagnosis. The recognition of diseased conditions rests fundamentally on an eye and perceptive faculties trained on the normal any departure therefrom is quickly recognized. The appearances of many conditions are characteristic. In other cases removal of specimens of secretions or tissue are essential for diagnosis.

Bronchoscopic Diagnosis of Cancer of the Lung. Here we have a mild slowly metastasizing relatively benign disease. Only an early diagnosis is required to enable the surgeon to obtain a good percentage of cures. The only way to make the diagnosis early is by bronchoscopy and histological confirmation. This is easily and safely obtained by the endoscopic removal of a specimen with the longer form of the forceps *K Figure 1*. Metastases cannot travel far in 18 hours which is all that is required for a histological examination. No complication has followed the taking of a specimen in any case. It is a deplorable fact that cancer of the lung is usually treated for a few years under an erroneous diagnosis.

The technique of bronchoscopic pneumonography was given in a previous issue of this journal (1).

Bronchoscopic treatment of disease. Endobronchial medication is useful in chronic inflammatory conditions and vaccines prepared from unconjugated bronchially removed specimens have been useful adjuncts to medical treatment of suppurative conditions but the outstanding feature of bronchoscopic treatment is the fact that purulent stagnation can be successfully combated by bronchoscopic aspiration in a certain proportion of cases. In most cases of inspissated foreign body no treatment other than bronchoscopic removal is indicated.

neuritis and atrophy. Such pressure blindness may disappear after several months. Aside from compression the inflammation may extend along the sheath to the papilla as perineuritis descends.

Neuritis is less frequent in the suppurative primary epidemic meningitis than in the tuberculous form. It is frequent in the otitic and other transmitted forms of meningitis.

Papillitis and atrophy may complicate acute superior hemorrhagic poliencephalitis.

In the epidemic form of meningitis neuritis with atrophy takes first place among ocular symptoms. This is also true of tuberculous meningitis in which optic neuritis is the most common symptom.

In pachymeningitis interna hemorrhagica a choked disc or a papillitis is frequently due to hematoma of the sheath of the optic nerve. Unilateral choked disc in this condition is a particularly valuable aid in diagnosis.

There is a rare form of chronic retrobulbar neuritis with mild papillitis due to atheroma or sclerotic changes in the central retinal artery. The interference with nutrition and pressure due to increase in the size of the vessel causes death of some of the fibers of the papillomacular bundle. An absolute scotoma results which is not strictly central.

Genet reports a case of optic neuritis which was the first intra ocular lesion in a patient with Bright's disease; the nerve disorder ran a typical course without retinal hemorrhages or exudates. Certain patients with severe neuroretinitis show little or no evidence of renal insufficiency though they may have marked vascular hypertension moderate peripheral arteriosclerosis and cardiac hypertrophy. The marked contraction of the smaller retinal vessels seems to be the determining local factor in the production of retinitis.

The advent of the neuroretinitis in these cases is usually of serious prognostic significance though not always. In certain cases the retinitis is the symptom which directs the attention of the

patient to himself. The apparent good health may in exceptional cases last for a long time.

White from a study of the relationship between the optic nerve disturbances and the size, shape and pneumatization of the optic nerve canals as determined in a series of 25 cases draws the following conclusions:

1. The optic canal is normally circular and approximately 5.5 millimeters though it may be from 3.5 to 6.5 millimeters.

2. The smaller the canal the greater the pneumatization, narrowing and distortion.

3. The size and shape of the canal can be determined by careful radiography.

4. There is greater danger of permanent impairment of vision in a canal abnormally small when a neuritis occurs than there is under the same circumstances when the canal is normal in size; here spontaneous recovery may be expected.

5. Neuritis in normal or large canals seems usually to be of extranasal origin.

Cases are reported of retrobulbar neuritis with consequent papillitis from ascariis lumbricoides, exposure to cold, emphysema of the lungs, uterine disease, leucocythæmia and lavage of the stomach. The papillitis due to influenza is of the acute retrobulbar variety, coming on 8 to 12 days after the onset of the influenza and preceded by pain.

Exposure neuritis usually is unilateral and is preceded by severe temporal and frontal pain. The character of the process is like that developed in influenza but the scotoma is seldom absolute.

There were 35 cases of unilateral neuritic atrophy seen in private practice. These cases were exhaustively studied with the following conclusions as to etiology: Syphilis 3, dental infection 1, tonsillar infection 2, brain tumor 2, encephalitis lethargica 1, nasal accessory sinus disease 2, mumps 1, chronic arsenical poisoning 1, cardiovascular disease 3, exposure to cold 1, secondary to disseminated choroiditis 1, multiple sclerosis 1, facial erysipelas 1, skull injury 1, senility 1, birth injury 1, contusion of the globe 1, toxæmia of pregnancy 1, undetermined 9.



Fig 7 The operator has insinuated the bronchoscope through the larynx the distal end is well down in the trachea He is now ready to remove the heavy laryngoscope leaving the light delicate bronchoscope alone in position (From advance sheets of *Bronchoscopy and Oesophagoscopy* by Chevalier Jackson 2d ed 1927 W B Saunders Co)

we have the œsophagus pinched together at the hiatus by the crura and the muscular fibers of the diaphragm. The point in the lumen of the œsophagus corresponding to this pinchcock closure is found by lowering the patient's head to the right and aiming the œsophagoscope (or gastroscope) for the anterior superior spine of the left ilium. Gentle but continuous pressure on the proper place will be rewarded after a few moments of patient waiting by the relaxation of the pinchcock. The opening of the hiatal constriction is usually accompanied by a rush of gastric fluid which will be clear if the stomach is empty and normal otherwise it may be mixed with pus, blood or food. Once the hiatus is passed the œsophagoscope slips so quickly and easily through the abdominal œsophagus that the existence of an abdominal œsophagus is not realized. There is no constriction of any kind functional or structural noticed at the cardia only a faint difference in color and a marked difference in the form of the folds.

If difficulty is experienced at the hiatal or cricopharyngeal pinchcocks the filiform (H Fig 1) may be used carefully through the tube by sight to find the lumen but this is unnecessary and unless very carefully done is unsafe.

Œsophagoscopy in cases of retention. The drainage canal in the œsophagoscope automatically removes all fluid secretions when the tube is held in the handle up position. If solid foods

floating in the fluid clog the inlet at the distal end it is quickly cleared by detaching the aspirating rubber tube (Fig 1). Usually all that is necessary is to pass down and rotate a gauze sponge (R Fig 1). In cases of preventriculosis (so-called cardiospasm) œsophageal lavage with the usual soft rubber apparatus for gastric lavage is generally advisable to remove the often large accumulations of stale food in the upper œsophagus.

Technique of œsophagoscopy removal of a specimen of tissue. The only certain way of making a diagnosis of cancer of the œsophagus early enough to be of any avail is by œsophagoscopy and removal of a specimen. All other methods are inferential and are late at best and often erroneous at worst. To warrant a transthoracic œsophagotomy on a man in the good general condition necessary to survive the major operation requires an absolutely positive diagnosis and this only the histologist can give. In endo-œsophageal cancer a specimen can be safely taken through the œsophagoscope under guidance of the eye with the long form of the forceps (A Figure 1). We have never seen any ill results from taking a specimen of tissue. Obviously it is unwise to penetrate normal œsophageal wall to search for a specimen of pericœsophageal cancer. In cases of suspected cancer high in the œsophagus it is well to inspect the hypopharynx and upper end of the œsophagus with the laryngoscope (4 Figure 1).

N	Reported by	Ref	Condition of Uterus	Time of External Twisting	Result	
					Mother	By
1	L. Portes (Paris)	Operation Dec 24, 1923 Gynéc et obst Lar 1924 x 241	Superficial sepsis	20 days	Well	Well
2	L. Portes (Paris)	Idem p 44	Separation of serous suture on eighth day otherwise clean	33 days	Well	Well
3	L. Portes (Paris)	Idem p 246	Slough and complete separation of uterine incision	57 days	Well	Well
4	L. Portes (Paris)	Idem p 249	Healed by first intention	25 days	Well	Well
5	P. Berson (Paris)	Bull Soc d obst et de gynéc de Lar 1924 xiv 586	Healed by first intention	17 days	Well	Well
6	P. Berson (Paris)	Idem	Healed by first intention	15 days	Well	Well
7	R. Audouin (Paris)	Idem p 787	Almost complete separation of uterine incision. Closed spontaneously	39 days	Well	Well
8	Maurice Rivière and Marc Rivière (Dordrecht)	Idem 1923 xiv 363	Separation of incision	54 days	Well	Well
9	Maurice Rivière and Marc Rivière (Dordrecht)	Idem p 364	Slight separation of serous suture at upper angle	41 days	Well	Well
10	M. Audouin (Toulouse)	Idem p 482	Slough and complete separation. Secondary suture	Not stated	Well	Well
11	Palacio Costa (Buenos Aires)	Idem p 511	Complete separation of incision	42 days	Well	Well
12	Roscher and Laftit (Paris)	Idem p 644	Sepsis increasing in severity	Hysterectomy on second day without anaesthesia in patient's bed	Well	Still born
13	Paul Guérin (Paris)	Idem 1926 xv 40	Small superficial slough and suppuration	39 days	Well	Well
14	Laffont Houel Dubouché Jahier (Alger)	Idem p 473	Slough and separation of incision	57 days	Well	Well
15	Laffont Houel Dubouché Jahier (Alger)	Idem p 474	Uterus seemed to slough in its totality on the eighth day	Hysterectomy on eighth day	Died on ninth day	Still born
16	Picard P. (Douai)	Idem p 583	Slough and separation. Secondary suture. Again separation of lower end of uterine incision	Hysterectomy on about the eighth day	Well	Well

de Gynecologie de Paris Professor A. Couve-
lars stated that he knew of 37 cases in which
the Portes operation had been performed and
the uterus returned to the pelvic cavity with
2 deaths or a mortality of 6 per cent. This

mortality is extremely low if one considers the
fact that these were cases of frank infection.

All these women who recovered saw the re-
turn of their menstrual function and resumed
their duties with comfort. At first the ob-
stetrical future of these patients was naturally

rest in bed is essential for chronic pulmonary suppuration under any method of treatment (Pritchard) and rest in bed outdoors is best.

After bronchoscopic pneumonography we usually keep the patient under observation for a few days though we have never seen any untoward result. A roentgen ray examination is usually made after a few weeks to record the disappearance of the bismuth or lipiodol.

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pregnancies the first terminating in her home as an instrumental delivery of a full term male child. The second pregnancy also reached full term and a second instrumental delivery of a male child was accomplished in her home. Both of these children are well today. The third pregnancy ended in a miscarriage at 3½ months. She was cared for in her home and curetting was not done. The puerperia were normal.

She started in labor in the early morning of October 17 1926 in her home. At 9:30 a.m. ether was administered and an instrumental delivery attempted. There were six attempts at high forceps delivery which were unsuccessful. The patient was then sent to the Gynecological and Obstetrical Service of the Carney Hospital where she was admitted after 13 hours of labor.

She weighed 210 pounds her appetite had always been good and her bowels regular there were no urinary symptoms there was no leucorrhœa and the patient was not subject to headaches.

Examination. The examination was essentially negative except for the obstetrical findings. A large fetus was presenting by the vertex in right occipito posterior position the fundus of the uterus was near the xiphoid cartilage. The uterus was firmly retracted on the fetus. The fetal heart tones could not be heard on auscultation. The vulva was markedly edematous and showed a number of ecchymotic areas. On rectal examination it was found impossible to reach the presenting part. We were practically certain that we were dealing with a dead baby. Despite this fact the uterus was so firmly retracted that it was thought that an attempt at craniotomy or embryotomy would result in a ruptured uterus. The patient was in a marked state of shock was coming out of ether and was having very frequent and strong contractions. Her temperature was 99.4 degrees F (37.3 degrees C) pulse 138 respirations 32 and the white blood count 26,200.

On admission the patient was given 1,000 cubic centimeters of salt solution under the breasts and ¼ grain (0.015 gram) of morphine sulphate hypodermically. It was thought that she was in too much shock to stand a caesarean section followed by a hysterectomy and since labor pains were strong and frequent it was evident that she should be delivered at once. It was therefore decided that the method which offered her the greatest safety was a caesarean section followed by temporary exteriorization of the uterus (the Portes operation).

Operation—caesarean section with temporary exteriorization of the uterus. The patient was catheterized taken to the operating room and given ether. The abdomen was opened by a long incision starting near the symphysis and ending near the xiphoid the incision being carried upward to the left of the umbilicus. The pregnant uterus was delivered the abdominal wall was sutured in one layer with double stay sutures of silkworm gut up to the posterior wall of the cervix. The abdominal wall was then covered with a towel and the pregnant uterus was dropped on it. A high incision was made in the anterior sur-

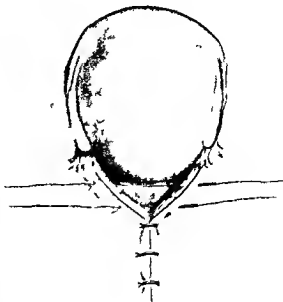


Fig. 1. Portes operation. Median abdominal incision from symphysis to near xiphoid cartilage. The pregnant uterus is placed in marked anteversion to permit the rapid suturing of the abdominal wall.

The sutured abdominal wall is covered with sterile towels the uterus is dropped on it gauze wicks are placed around the lower segment and an incision is made on the anterior wall encroaching on the fundus. The fetus placenta and membranes are extracted and the uterine incision is closed in two layers with No. 2 chromic catgut.

The uterus is covered with a moist sterile dressing and a tight abdominal binder is applied.

face of the uterus extending over the fundus. A stillborn male child weighing 10 pounds 2 ounces (4,636 grams) was extracted by the breech with great difficulty as the uterus was firmly contracted on it. The placenta and membranes were removed through the incision. The contents of the uterine cavity had a foul odor. The uterine incision was closed in two layers with No. 2 chromic catgut the first layer interrupted and the second continuous. Intermediate sutures of silkworm gut were then placed between the stay sutures to the abdominal wall one stay suture of silkworm gut was placed anteriorly at the lower edge of the incision. The uterus and the adnexa were allowed to stay on the abdominal wall they were covered with a moist dressing and a sterile towel and an abdominal binder was applied. The patient was returned to her bed with a pulse of 136. The baby's head and face were considerably bruised by the previous application of forceps. On the right the skin had peeled over the neck apparently where the tip of the forceps blade had reached. The head was unmoiled. The time of the operation was 30 minutes.

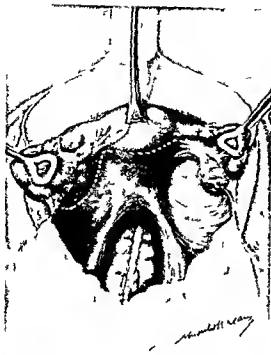


Fig. 1 Tracing of the line of excision of the adnexa

tempted to preserve one ovary and the whole uterus. But experience has shown that this is bad practice and it has been almost entirely abandoned. In these cases the fundus of the uterus is always diseased. It is the site of a hyperplastic endometritis which resists treatment and a source of serious trouble after the operation often necessitating another operation. Therefore it is absolutely necessary in the course of the ablation of the two tubes to remove the fundus of the uterus which is always affected by inflammation.

Fundal hysterectomy is therefore particularly indicated in these cases for it enables the surgeon to remove the diseased parts freely but still remains a conservative operation.

But it cannot be extended to all cases for there are very important contra indications and if the surgeon overlooks them he runs the risk of serious results.

In practice the indication for the operation depends on two factors: (a) The inflammatory lesions must long since have passed the acute stage and (b) there must be no extensive perisalpingitis or serious changes in the pelvic peritoneum resulting from it. In other words it

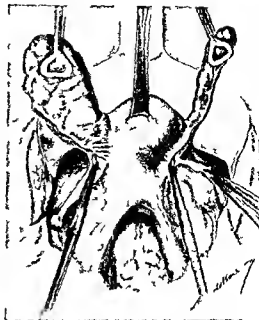


Fig. 2 Hemostasis of the different vessel pedicles

must be easy to accomplish complete peritonization. The peritoneum must be supple, mobile and easy to pull into the desired position.

At the beginning of our use of the operation which now includes 130 cases we had 2 deaths due evidently to the fact that we had exceeded the limits within which the operation is indicated. In these 2 cases the operation was performed for adnexitis with extensive adhesions and active suppuration. The pelvic peritoneum was greatly changed by serious lesions due to perisalpingitis. The two patients died of slow peritonitis.

We think that by limiting the indications for the operation and defining them more accurately such accidents can be prevented in the future. In our last 40 cases there has been no mortality.

TECHNIQUE

The technique of fundal hysterectomy is simple. We particularly want to give a clear description of what we consider the two essential steps: the hemostatic suture of the uterus and peritonization.

There is nothing especially difficult about the incision of the wall; it is a vertical median or arcuate incision of the Pfannenstiel type.

When the abdomen has been opened the lesions examined fundal hysterectomy decided

pregnancies the first terminating in her home as an instrumental delivery of a full term male child. The second pregnancy also reached full term and a second instrumental delivery of a male child was accomplished in her home. Both of these children are well today. The third pregnancy ended in a miscarriage at 3½ months. She was cared for in her home and suturing was not done. The puerperia were normal.

She started in labor in the early morning of October 17, 1926 in her home. At 9:30 a.m. ether was administered and an instrumental delivery attempted. There were six attempts at high forceps delivery which were unsuccessful. The patient was then sent to the Gynecological and Obstetrical Service of the Carney Hospital where she was admitted after 13 hours of labor.

She weighed 210 pounds, her appetite had always been good and her bowels regular; there were no urinary symptoms; there was no leucorrhœa and the patient was not subject to headaches.

Examination. The examination was essentially negative except for the obstetrical findings. A large fetus was presenting by the vertex in right occipito-posterior position; the fundus of the uterus was near the xiphoid cartilage. The uterus was firmly retracted on the fetus. The fetal heart tones could not be heard on auscultation. The vulva was markedly edematous and showed a number of ecchymotic areas. On rectal examination it was found impossible to reach the presenting part. We were practically certain that we were dealing with a dead baby. Despite this fact the uterus was so firmly retracted that it was thought that an attempt at craniotomy or embryotomy would result in a ruptured uterus. The patient was in a marked state of shock was coming out of ether and was having very frequent and strong contractions. Her temperature was 99.4 degrees F (37.3 degrees C), pulse 128 respirations 32 and the white blood count 26,200.

On admission the parturient was given 2,000 cubic centimeters of salt solution under the breasts and ¼ grain (0.15 gram) of morphine sulphate hypodermically. It was thought that she was in too much shock to stand a cesarean section followed by a hysterectomy and since labor pains were strong and frequent it was evident that she should be delivered at once. It was therefore decided that the method which offered her the greatest safety was a cesarean section followed by temporary extention of the uterus (the Portes operation).

Operation—cesarean section with temporary extention of the uterus. The patient was catheterized taken to the operating room and given ether. The abdomen was opened by a long incision starting near the symphysis and ending near the xiphoid; the incision being carried upward to the left of the umbilicus. The pregnant uterus was delivered; the abdominal wall was sutured in one layer with double stay sutures of silk worm gut up to the posterior wall of the cervix. The abdominal wall was then covered with a towel and the pregnant uterus was dropped on it. A high incision was made in the anterior sur-

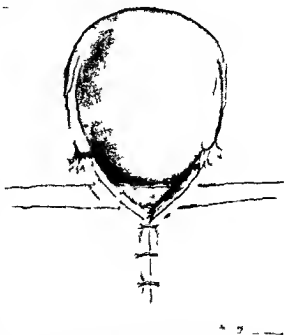


Fig. 1. Portes operation. Median abdominal incision from symphysis to near xiphoid cartilage. The pregnant uterus is placed in marked anteversion to permit the rapid suturing of the abdominal wall.

The sutured abdominal wall is covered with sterile towels; the uterus is dropped on it; gauze wicks are placed around the lower segment and an incision is made on the anterior wall encroaching on the fundus. The fetus, placenta and membranes are extracted and the uterine incision is closed in two layers with No. 2 chromic catgut.

The uterus is covered with a moist sterile dressing and a tight abdominal binder is applied.

face of the uterus extending over the fundus. A stillborn male child weighing 10 pounds 2 ounces (4,636 grams) was extracted by the breech with great difficulty as the uterus was firmly contracted on it. The placenta and membranes were removed through the incision. The contents of the uterine cavity had a foul odor. The uterine incision was closed in two layers with No. 2 chromic catgut; the first layer interrupted and the second continuous. Intermediate sutures of silk worm gut were then placed between the stay sutures to the abdominal wall; one stay suture of silk worm gut was placed anteriorly at the lower edge of the incision. The uterus and the adnexa were allowed to stay on the abdominal wall; they were covered with a moist dressing and a sterile towel and an abdominal binder was applied. The patient was returned to her bed with a pulse of 136. The baby's head and face were considerably bruised by the previous application of forceps. On the right the skin had peeled over the neck; apparently where the tip of the forceps blade had reached. The head was unmoiled. The time of the operation was 30 minutes.

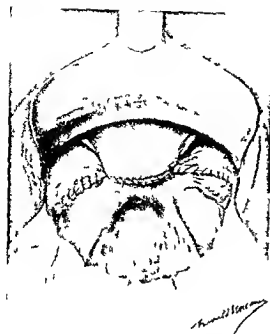


Fig. 5 Complete peritonization with supavesical and retrovesical peritoneum

suture is a very important step for it accomplishes hæmostasis by bringing together the walls of the uterus which sometimes bleed copiously especially in the case of a very oedematous uterus. This step should be executed with the greatest care for postoperative hæmorrhage may be a source of very serious danger. One of our patients died after the operation from subperitoneal and intrapelvic hæmorrhage. One of us saw a case of pelvic hæmatoma which necessitated an incision for evacuation.

The walls of the uterus must be brought together very carefully first by a row of large interrupted catgut sutures which include the whole of the wall of the uterus on each side. These must be reinforced by an overcast hæmostatic suture of catgut. At the end of this step the line of suture should be absolutely free of blood if there is even the slightest oozing of blood at any point a few reinforcing sutures should be added.

We now come to the peritonization which is one of the essential steps in the operation. The stump of the uterus cannot be peritonized with the uterine peritoneum alone as at this level it is adherent to the body of the uterus down to the isthmus and cannot be pulled or folded. Peritonization therefore should be accomplished only by means of the preuterine peritoneum

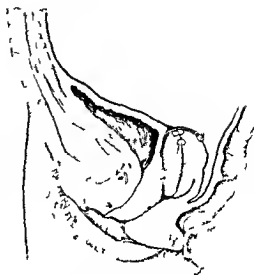


Fig. 6 Diagram showing the different stages of the sutures at the end of the operation

(the inter utero vesical peritoneum) which is mobile and very easy to pull backward.

The peritonization of the lateral parts does not present any special difficulty. On the side where the ovary has been left the suture of the peritoneum passes in front of it leaving it completely intraperitoneal. It is not necessary to bury the ovary in the new broad ligament. This position aside from the fact that it does not correspond at all to normal anatomy might cause trouble later such as particularly intense pain at the menstrual period.

The peritonization of the line of suture of the uterus is more important. When the overcast stitch of the peritonization reaches the lateral angle of the stump of the uterus it is passed as follows. The needle first catches the peritoneum of the posterior surface of the uterus well back of the section then it is passed into the retrovesical peritoneum just back of the bladder at the place where the peritoneum is very mobile and easy to pull backward. A rather large fold is lifted up at this point with a dissecting forceps and the suture passed into it. The first stitch sometimes has to be made in two stages because the distance that separates the two surfaces of peritoneum which are to be brought together is so great but once the first stitch is brought together the retrovesical peritoneum caps the uterus spontaneously and the other stitches can be passed at one step and very easily.



Fig 4. Portes operation. The adhesions to the uterovaginal pedicle are at first separated with scissors and then with the finger until the pedicle is free from the abdominal wall. The uterus and the adnexa are dropped in the pelvic cavity where they assume their normal positions.

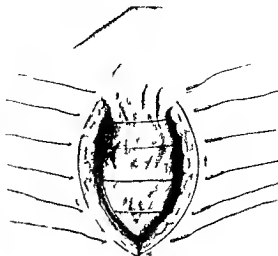


Fig 5. Portes operation. Through and through sutures of silk, omentum gut booted with fine rubber tubing are introduced. A cigarette drain is placed in the cul de sac of Douglas and come out behind the uterus. The gauze is withdrawn the omentum is brought down and the sutures are tied.

far as could be determined was clean. A slight vaginal discharge was present.

November 1. The patient had a rise in temperature with pain in the back. The chest examination was negative.

On November 11, 12, and 13 the uterus was clean and involution was taking place. The patient was complaining of pain in the right lower chest but the sounds were clear.

November 15. The chest signs were typical of pneumonia there being a patch of consolidation in the right lower lobe.

November 16. The diagnosis of lobar pneumonia of the right lower lobe was verified and treatment instituted. The phlebitis had cleared up, the uterus was clean and the abdominal incision was also clean. An abscess of the neck to the left of the median line developed in the scar which had resulted from a previous burn. The abscess was opened and drained, considerable pus being obtained. This promptly healed.

November 17. The signs in the chest had disappeared and the patient felt much better. She was eating well and appeared in good health. The uterus was clean, the tubes and ovaries were still edematous but not septic.

November 18. The uterus was now about the size of an orange. The tubes and ovaries were still slightly edematous but were clean. The fimbriated extremities were everted, the tubes were patent, the ovaries were slightly larger than normal, the whole uterus, tubes and ovaries were clean, so far as could be determined. The abdominal wall was clean and the uterine incision had healed firmly, it being rather difficult to find. The patient was prepared for a secondary replacement of the uterus, tubes and ovaries, the pelvic organs having been extruded for 41 days.

Operation—secondary replacement of uterus, tubes and ovaries. The abdomen, the uterus and the adnexa were cleaned with ether and were then painted with 3½ per cent tincture of iodine, covered with sterile towels and a binder. The patient was given ether and taken to the operating room. Here a coat of 7 per cent tincture of iodine was applied to the abdominal wall to the uterus and to the adnexa. The abdominal incision was reopened posterior to the uterus and to a point slightly above the level of the umbilicus. Upon opening the abdominal cavity but one fine omental adhesion to the parietal peritoneum on the right of the incision was found. There were no intestinal adhesions. With scissors and the finger the abdominal wall was freed from the posterior surface of the uterus from the utero-

CLINICAL SURGERY

FROM THE CHEVALIER JACKSON CLINIC

BRONCHOSCOPY AND ŒSOPHAGOSCOPY

A BRIEF CONSIDERATION OF TECHNIQUE

By CHEVALIER JACKSON, M.D., Sc.D., F.A.C.S., PHILADELPHIA

DANGERS, COMPLICATIONS, AND CONTRA-INDICATIONS

WHEN skillfully introduced there is absolutely no danger whatever from the mere presence of a bronchoscope in the laryngotracheobronchial airway nor of an œsophagoscope in the œsophagus and stomach. On the other hand when an otherwise skilful but endoscopically untaught man starts to introduce either of these instruments into a dyspnoic baby the chances of the baby's survival are exceedingly remote. It is true that any physician or surgeon can be taught how to introduce these instruments safely yet it is equally true that he cannot learn how to introduce them by looking on at a clinic. In principle the bronchoscope, the œsophagoscope and the gastroscope are specula but their introduction is highly technical as compared to the introduction of a vaginal or rectal speculum. If an œsophagoscope is inserted into the pharynx and simply pushed downward the one place it will not go is into the œsophagus. Only a slight push is necessary to send it through the hypopharyngeal wall where it will meet with less resistance in its progress down between the layers into the mediastinum than it would if it were going down inside the œsophageal lumen.

Dyspnea. A patient dyspnoic from true asthma is in no particular danger from bronchoscopy but a patient supposed to have asthma but really dyspnoic from mechanical obstruction of the airway by disease or by foreign body is likely to die on the table unless handled by a team of 3 all trained to act together with promptness and precision. The danger in dyspnoic patients especially babies may be as great in œsophageal as in laryngotracheal cases for the reason illustrated in Figure 2.

Trauma. Apart from the trauma of false passage of instruments by the untaught fatal trauma may be inflicted by improper attempts to deal

with a foreign body. A trained man may harmlessly manipulate a safety pin for a half hour because he knows that advancing points perforate trailing points do not (3 8 10). Furthermore he not only knows this but he is trained until it is impressed upon his subconscious mentality that only an exceedingly slight pull is required to drive a point through the wall of either the œsophagus or bronchus (Fig. 3). The same principle applies to all pointed objects: nails, pins, tacks, hooks, staples, etc.

Contra indications to bronchoscopy and œsophagoscopy are few and none would contra indicate endoscopic removal of a foreign body (3). High blood pressure, advanced cardiovascular disease, aneurysm, active syphilis or tuberculosis and other organic diseases must be weighed against the urgency of the indications for the procedure and call for preparatory treatment of the patient. Pneumonia is no contra indication and in foreign body cases the supposed pneumonia is usually an error in diagnosis (14). In cases of embolic abscess a moribund condition of the patient may contra indicate bronchoscopy not because bronchoscopy would hasten the end but because it would be powerless to prevent it. In babies and in very young children bronchoscopy should not be prolonged beyond 5 minutes and repetition of the procedure is contra indicated without an interval of a few days, preferably a week.

Mediastinal emphysema, pneumothorax and septic mediastinitis are rare complications. They may occur spontaneously before bronchoscopy or œsophagoscopy (3 10) or may be due to perforation by a safety pin or other foreign body under manipulation. The gravity of these complications should always be in the mind of the peroral endoscopist to keep his cautiousness up to the utmost.

Mortality. Considered apart from the condition for which it is done there is no mortality attached

"BASEBALL COVER FLAPS" IN LEG AND THIGH AMPUTATIONS

By THOMAS G ORR MD FACS KANSAS CITY MISSOURI

From the Department of Surgery, University of Kansas

TO produce a smooth stump with properly placed scar is the aim of every surgeon doing an amputation when an artificial limb is to be worn.

The technique of flap making here illustrated enables the operator to close the wound without the troublesome redundant skin so common in other flaps. Properly made flaps avoid skin

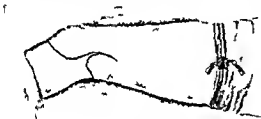


Fig 1. Lines of incision for baseball cover flaps

puckering. Ill fitting flaps produce irregularities and pockets which are easily irritated by artificial limb sockets.

In every finished amputation of the lower extremity the muscles should be grouped about the end of the bone. This not only gives the right shape for flap fitting but properly places the cut ends of the muscles for healing with new insertions at the stump end. When the muscles heal with proper insertions the future function of the stump is assured insofar as motion is concerned.

The method of making the incisions for the baseball cover flaps is shown in Figure 1. The old rule of making the sum of the length of the flaps equal to one and one half times the diameter of the extremity applies here. The measurements should be made from the site selected for the bone section. This is easily and accurately done with a piece of catgut or other suture material by taking half of the circumference which is the length desired for the sum of the two flaps being approximately one and one half times the diameter of the extremity. Flaps of equal width can also be estimated by measuring the circumference and making the flaps one half the circumference in width.

Care should be exercised not to make the long anterior flap too narrow at the base and thus interfere with the blood supply. The posterior flap should be short and not dissected from the muscle

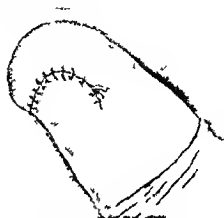


Fig 2. Lateral view after closure of flaps



Fig 3. Posterior view of stump with anterior flap sutured in place

except for a sufficient distance to enable easy suturing to the anterior flap. In all cases the deep fascia should be raised with the skin flap. Separation of the skin and deep fascia only disturbs the circulation of both and can serve no good purpose. The deep fascia should always be carefully closed since it is the normal envelope of the muscles and aids in making a smooth stump by avoiding adhesions between the skin and the muscle.

When the anterior flap is brought over a well rounded stump end it will fit accurately into the short posterior flap (Figs 2 and 3).

The baseball cover flap can be successfully used in all cases in which sufficient skin for such flaps is available, no active infection is present and the circulation is not greatly impaired.

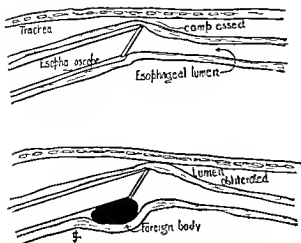


Fig 2 Serious obstruction of the trachea from crowding of the party wall into the trachea during oesophagoscopy especially in babies and very young children. A phytia will soon result if the condition is not promptly recognized. A proper position of the patient and careful work will serve to avoid all danger of this complication. Even without a foreign body the bulk of an oesophago scope may cause dyspnoea in babies unless a very small tube is used (From advance sheets of *Bronchoscopy and Oesophagoscopy* by Chevalier Jackson 2d ed 1927 W B Saunders Co.)

Asepsis of the field is impossible but a clean mouth should be insisted upon in adults and older children. Examination of the mouth for artificial dentures bridge work loose crowns deciduous teeth etc is essential to forestall accidents in the use of the bite block and tube. Examination of the nose the fauces pharynx and larynx is always essential. Mirror examination of the larynx for a local lesion or a recurrent paralysis should never be omitted. Rest and relaxation in bed is a desirable preliminary to the first endoscopy but is dispensed with after the first time in ambulatory patients. A laxative is advisable especially if a sedative is to be used.

TECHNIQUE

Preliminary training. As with all purely manual procedures education of the eyes and fingers is essential to success additionally in peroral endoscopy it is essential to safety of the patient. Anyone who regards it beneath his dignity preliminarily to educate his eyes and fingers in the technique of the cataract operation by practice on sheep or pigs eyes from butchered animals had better not attempt a cataract operation on a living human being. The dead eye affords better preliminary practice anyway because work on it is free from anxiety or stress. And the cataract

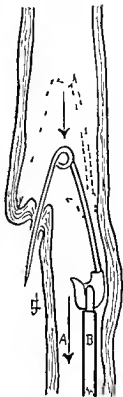


Fig 3 Schematic drawing of what will happen if the author's dictum advancing points perforate trailing points do not is ignored. Injudicious traction by the forceps B in the direction of the dart A has drawn the pin upward from the position shown dotted and has drawn the advancing point through the esophageal wall (From *Bronchoscopy and Oesophagoscopy* by Chevalier Jackson 2d ed 1927 W B Saunders Co.)

operation is done under binocular control. Peroral endoscopy is done under monocular control which is not only unusual but involves depth perception with one eye a thing that is difficult to acquire to a useful degree and impossible to acquire to perfection. Absolutely nothing will take the place of education of the eye at the tube. Fortunately a rubber tube manikin affords an easy handy care-free always ready means of education of the eye and the fingers in all the essentials. The man who will use his spare moments for manipulating various foreign bodies in a rubber tube under guidance of the eye will with a little training on the cadaver as to the dangers to be avoided and how to avoid them and on the dog for the problems presented by the movements of the living bronchi soon make a safe and successful bronchoscopist. Of course it is essential to have training on the human being

It seems to be a new thought to most men yet the thought is basic to all true pedagogic principle that the technique of the master should be copied not because it is the way the master does it but for the same reason that led the master to adopt that technique. The result may be the same the student learns the master's technique but with the vast difference that in the one instance he is but a mimic in the other instance he has grasped the reasoning the mental workings of the master's mind. And when the occasion arises in which the student is confronted by a new problem he will reason it out as the master would have done he has become a true disciple.

The considerations which I wish to present are the result of an attempt to teach to would be surgeons both undergraduates and graduates in medicine the principles of intraperitoneal surgery. To this end we have used the operation of end to end anastomosis of the small intestine for it has seemed that the fundamental principles can best be taught in the consideration of this one operation. The same principles apply to the entire gastro intestinal tract whether stomach small intestine or large intestine whether lateral or end to end anastomosis. Perhaps some of the much discussed problems as to whether an end to end or a lateral anastomosis is to be preferred can be solved if we understand the principles involved. The conclusions which I here present are the gradual product of 18 years of such teaching with much experiment and trial of different ideas.

There have been some 250 methods devised (DaCosta). Would it be presumptuous to assert that the reason for this multiplicity of suggestion is because the basic principles have not been grasped? Certain it is that the reasoning that led to some of these suggestions was wrong certain it is that the teaching found in our most modern textbooks is wrong certain it is that the most recent discussions and suggestions to be found in the literature within the past few years (5 6 10 11 12 20 23 6) do not even hint at the vital considerations and I have not found in the literature a complete analysis of the physiology and the mechanical values of the component structures of the intestinal wall.

Let us look at the material with which we are to work first from the anatomical and physiological side and then consider this material from the standpoint of surgical technique.

The intestine is composed of a series of tubes drawn one over the other. On the outside there is a tube of peritoneum or serous membrane. Perhaps it is strictly speaking not a tube for it is incomplete there being a V shaped space along

the attachment of the mesentery within which lie the blood vessels lymphatics and nerve trunks and at the top of which is a portion of the intestinal wall which has no covering of serous membrane. This area will therefore require a surgical treatment different from that required by the rest of the surface to which point we will return later.

The peritoneum the serous membrane lining the abdominal cavity and covering more or less completely the therein contained organs consists of a connective tissue stroma and the surface layer of mesothelium (15). The young mesodermic cells bordering the early body cavity become differentiated into a delicate lining for this space and later give rise to the plate like elements which constitute the lining of the permanent serous sacs. The primary lining is known as the mesothelium which name is often retained to designate the investment of the pericardial pleural and peritoneal cavities as distinguished from the endothelium which lines the vascular and other serous spaces (16). The latter (the mesothelium) is a single layer of plate like cells irregularly polygonal in form and of varying size whose contours are mapped out after staining with silver nitrate by delicate sinuous dark lines that correspond with the particles of reduced silver in the intercellular cement substance. Each cell encloses a flattened nucleus usually somewhat eccentrically placed that is almost invisible until tinged with some appropriate dye (Fig 1). The size and form of the mesothelial plates vary much with the tension to which they are subjected when unduly stretched they are often imperfect or indeed displaced.

The stroma consists of a felt work of connective tissue bundles of variable fineness those of the parietal being commonly more robust than those of the visceral peritoneum. This fibroelastic layer varies in thickness but in many places as over the liver stomach or intestines where the peritoneum is intimately attached the subserous tissue is so reduced as to be practically wanting (17).

This is a consideration of the serous membrane as seen from the surface. Suppose we examine it in cross section of the intestinal wall. We will find these mesothelial cells as very thin lines with the nucleus bulging outward the entire cell at its thickest point through the nucleus being of no greater thickness than the diameter of the red blood cell. If we are looking at a piece of intestine where there is some connective tissue stroma we may see a structure which we could call a serous membrane of perhaps three times the thickness

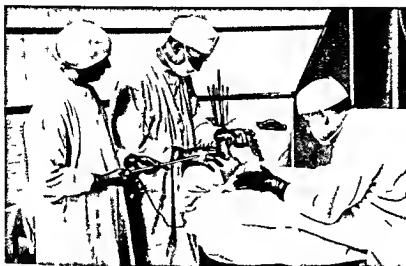


Fig 5 Exposure of the larynx with the laryngoscope preliminary to the introduction of the bronchoscope. The bronchoscope is being held by the instrument nurse point forward handle to the right. The head of the patient may be lowered later a required to present the orifices and lumina of the bronchi but at the introductory stage it must be high as shown here and the operator must be standing. Note that the laryngoscope is in the operator's left hand while his right hand draws the patient's upper lip away from the teeth. It is easier to expose the larynx with the left hand than with the right and it is essential to do it this way. After the glottis is exposed the operator takes the bronchoscope from the nurse and insinuates it through the larynx under the guidance of the eye at the proximal end of the tube

also but we never permit our pupils to attempt to introduce a bronchoscope or oesophagoscope until after they have had at least 2 weeks of intensive instruction and practice on rubber tube dog and cadaver. Most of these pupils have been practicing otorhinology for years and hence have had hundreds of hours of practice in depth perception with one eye only. In case of a man who has had training only as a surgeon using both eyes and both hands in open wounds we would regard a longer preliminary foreign body practice with the rubber tube essential even for endoscopy for disease unconnected with foreign body. The early human endoscopies should be on adults later on older children only after prolonged practice and experience is it justifiable to put an endoscopic tube down the tender passages of a baby.

Direct laryngoscopy. Exposure of the larynx to view is the first step in bronchoscopy. The larynx of any human being who can open his mouth can be exposed to direct view provided the essentials of position and manipulation have been mastered. For children anaesthesia general or local is quite unnecessary and in dyspnoeic patients dangerous for this procedure. The entire interior of the larynx of any child even the newborn infant can be examined in a few minutes without any

anaesthetic general or local. In adults general anaesthesia is never required even local anaesthesia may be dispensed with. It is usually advisable however to use local anaesthesia in adults and a sedative may be added if there is no contra indication. The cocaine solution in about 8 per cent strength is applied with a curved laryngeal applicator to the laryngopharynx and pyriform sinuses in the region of the superior laryngeal nerves. This is usually sufficient but if the laryngeal reflexes still seem too active a little of the same or a stronger (20 per cent) solution may be applied to the interior of the larynx with a gauze sponge in the straight applicator (R. Fig 1) after the larynx is exposed to view with the laryngoscope. The patient is then placed in the position shown in Figures 4 5 and 7. The operator must be *standing* and must remain standing during the examination. Crouching on the floor will totally defeat the object obtained by the proper position of the patient. The laryngoscope held in the left hand in the position shown at A. Figure 6 is introduced back along the dorsum of the tongue and the tip of the epiglottis is exposed to view. The lip of the laryngoscope is inserted beyond the proximal edge of the epiglottis for a distance of more than 1 centimeter in a child or

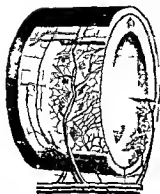


Fig. 3 Showing how the blood vessels lie upon and within the submucosa (From Mall 13)

cement substance that pass between and around the fiber cells (18)

Beneath this tube lies a thicker tube of involuntary muscle cells arranged circularly. It is made up of the same elements as the longitudinal muscle bundle but is a larger structure. A stitch laid through this coat has a certain holding power yet I find that it is only with the utmost care that stitches can be laid using all three of the intestinal coats thus far considered. These three layers together have so little fibrous tissue in their structure that stitches in them alone can act only as approximating stitches and even so they cannot be drawn tightly enough to secure a dependable approximation.

Underneath this tube of circular muscle lies a tube of connective tissue of the type called loose fibrous or areolar tissue constituting the real foundation structure of the intestinal wall.

Loose fibrous or areolar tissue occurs throughout the body wherever the opposed parts although connected enjoy considerable mobility. Familiar examples are the sheets or tracts of yielding connective tissue which lie between the skin and underlying fascia or beneath mucous membranes that unite the muscles and assist in keeping the viscera in place. The variable bundles of white fibers are loosely and irregularly disposed crossing in all directions and enclosing correspondingly indefinite lymphatic clefts. The elastic fibers form a network of highly refracting threads which in sections and teased preparations are more or less wavy and curled (19).

There is very little elastic tissue in the intestinal wall; the stretching of the wall is accomplished more because of the interlacing direction of the fibers than by means of a direct stretching of elastic elements.

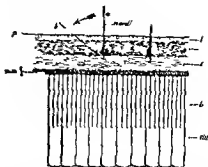


Fig. 4 Photograph of the drawing by Mall published by Hatt (8) (9). An actual needle was laid upon the picture before photographing. This to emphasize that in Mall's drawing a needle smaller than an actual needle has been drawn into a representation of the intestinal wall enlarged to 5 centimeters in width.

This layer is called the submucosa (Fig. 3); it is the foundation about which the entire organ is built. On the inside it supports the essential functional element the mucosa; on the outside it carries the muscle tubes by means of which the contents can be propelled along the surface of the mucosa. It offers within itself a support for the bloodvessels and lymphatics (13). It is a tough though thin membrane giving to the intestinal wall almost all of its strength. This strength is quite considerable; we have found that the intestine of a dog can resist a bursting pressure of 17 pounds. Section of the mucosa down to this submucosa does not diminish this strength like wise section of the muscular coat, but little difference in the pressure required to cause bursting. In fact when a section of fresh intestine is blown up the muscle layers may be seen to exhibit long tears extending all the way to the submucosa long before the bursting point of the submucosa is reached. This tube constitutes the sausage casing of commerce.

Anatomically and physiologically this submucosa is simple in its properties. It is only a foundation upon which the other all important layers are supported. Surgically it is the one component of the intestinal wall possessing mechanical properties which can be utilized. It is the only part of the wall which is resistant to the pull of a stitch. This was recognized long ago by Halsted (8) and his teaching has been commonly introduced into our textbooks. We believe that a part of this teaching is erroneous and will return to the subject later.

For the moment let us emphasize this point just as this submucosa constitutes the support work, the structural steel work upon which all

INTRODUCTION OF THE OESOPHAGOSCOPE

The first thing to realize is that if an oesophagoscope is simply put into the pharynx and pushed upon it will not go into the oesophagus but into the tissues of the mediastinum. Oesophagoscopy is so totally unlike the introduction of a soft rubber stomach tube that the practitioner unformed of the difference will almost certainly cause perforation with the oesophagoscope. It is essential that close attention be given to the following details. The introduction of the oesophagoscope calls for the exact position of the patient described (Fig 4). With the oesophagoscope vertical the standing operator finds the right pyriform sinus by sight no mandrin being used (Fig 7). Passing downward the operator finds the first obstacle at the bottom of the hypopharynx in the rigid contraction of the cricopharyngeus muscle. It is necessary to wait for this to relax but while waiting continuous gentle advancing pressure must be maintained and at the same time the oesophagoscope must be pressed anteriorward by the left thumb to lift it away from the posterior weak point where it otherwise is almost certain to perforate. This must be done without lowering the head of the patient. The handle of the oesophagoscope is not grasped in the hand. It must be up by which we know the lip of the tube mouth is anterior and away from the danger point. The general direction of the entire oesophagoscope is maintained by aiming for the median line as indicated by the midline of the sternum notwithstanding the fact that we are starting from one side in the right pyriform sinus. Care must be taken not to point clear across toward the left side. The opening of the lumen is watched for in the anterior part of the field. The relaxation of the cricopharyngeal pinchcock is usually accompanied by a regurgitation of saliva and the slanted end of the tube mouth glides over anterior to the relaxing cricopharyngeus muscle. The rush of saliva is quickly and automatically removed by the aspirating canal if the handle of the oesophagoscope is up as it should be. Exploration of the thoracic oesophagus is simply a matter of following the lumen as it opens up ahead a procedure easy of accomplishment when the head is held in the air free to be moved in every direction as indicated above. The operator follows the lumen the assistant follows the operator with the patient's head. At the hiatus oesophageus the oesophagus goes through the diaphragmatic pinchcock. Just as the rubber tube of a burette is pinched tightly shut by the spring clip known as a pinchcock just so

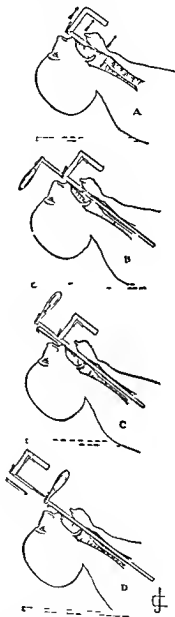


Fig 6 Schema illustrating oral bronchoscopy. The portion of the table here shown under the head is in actual work dropped all the way down perpendicularly. It appears in these drawings as a dotted line to emphasize the fact that the head must be above the level of the table during the introduction of the bronchoscope into the trachea. A Exposure of larynx. B bronchoscope introduced. C larynx removed. D larynx removed leaving bronchoscope alone in position. (From *Bronch copy and Oesophagoscopy* by Chevalier Jackson 2d ed 1927 W. B. Saunders Co.)



Fig 8 Œsophagoscopy by the author's high low method First stage High position Finding the right pyriform sinus In this and the second stage the patient's vertex is about 25 centimeters above the level of the table and the operator must be standing After the Œsophagoscopic tube mouth reaches the mediastinal Œsophagus the head is lowered as required by the operator to follow the lumen as seen through the tube When the diaphragmatic level is reached the patient's vertex is level with the table top (From advance sheets of *Bronchoscopy and Œsophagoscopy* by Chevalier Jackson 2d ed 1917 W B Saunders Co)

BRONCHOSCOPIC AND ŒSOPHAGOSCOPIC EXTRACTION OF FOREIGN BODIES

The mechanical problems presented by foreign bodies in the air and food passages are of infinite variety. Some may be pulled out after being grasped by any part first seen in other cases to do this would be fatal. Study and work with a duplicate of the foreign body in a rubber tube is essential to safety as well as success in cases of safety pins staples pins needles tacks jacks collar buttons and in fact almost all foreign bodies. The many problems presented and their solution have been extensively dealt with elsewhere (3 5 6 8 10 11 17)

AFTER CARE

In cases of chronic disease of the Œsophagus no anæsthetic or sedative being used the patients adults or children come in get on the table and go home or back to work. In chronic suppurative disease of the lung most patients are kept in bed a large part of every 24 hours as a useful adjunct to medical care. If this is carried out at home the patients come in at the appointed time for bronchoscopic aspiration and return home immediately after treatment. Hospitalized patients rest in bed until the next morning. In patients with

slight hæmoptysis rest in bed is essential. Severe hæmorrhage is a contra indication to bronchoscopy except in rare cases in which bronchoscopy is done to arrest bleeding (12)

In very young children especially in cases of vegetal bronchitis from inspired peanuts and other nut kernels beans peas watermelon seeds fruit pits etc there is usually as a part of the diffuse laryngotracheobronchitis a swelling of the subglottic tissues. This causes a croupiness and in children under 2 years of age the swelling may be so great in a few cases as to require tracheotomy for obstructive laryngeal dyspnoea. For this reason children are always kept in bed in the hospital after bronchoscopy for 2 or 3 days for observation. In cases of lung suppuration from prolonged sojourn of a foreign body the patient usually requires no after treatment other than rest in bed under fresh air conditions and he is usually sent home within a few days after bronchoscopy for this to be carried out under the care of the family physician.

Older children under treatment for suppuration of other than foreign body origin are brought in for bronchoscopic aspiration and are allowed to go home immediately afterward. Not using an anæsthetic general or local makes this possible. Nevertheless for its therapeutic effect plenty of

membrane a tube of infection varying in its character but never lacking. And this infection is not only on the surface but extends down between the villi into the crypts and doubtless farther into the mouths of the glands of the intestine which glands lie beneath the muscularis mucosæ within the submucosa. It therefore seems idle to assert that one can lay a stitch through all the coats but the mucosa (22).

The surgeon is therefore confronted with the problem of dealing with two delicate invisible intangible tubes an outer tube of delicate mesothelial cells absolutely necessary to his purposes and an inner tube of infectious material which he must avoid which is so intangible that if the point of his needle but touches it the infection will follow his thread wherever it may go. Between these tubes there is a very definite very resistant structure which he can see and feel and sew as this submucosa is the framework of the intestine so must the surgeon make it the framework of his repair.

How can the surgeon save peritoneum and avoid mucosa that is infection? This is the problem of intraperitoneal surgery.

If we turn to the textbooks the answer appears simple the needle is to be simply inserted into the submucosa but must not go all the way through this layer. Thus a sufficient bite will be obtained in a tissue tough enough to hold the pull of the stitch yet the needle and thread will not be infected by contact with this invisible intangible inner tube of infection of which I have spoken. Such is the teaching in the majority of textbooks. It is based upon the work of the late Professor Halsted of Baltimore who was the first to call attention to the finer anatomy of the intestinal wall and to the importance of a knowledge of this finer structure to surgery (8).

While therefore I cannot claim the honor of being the first to discuss the surgery of the gastro-intestinal tract from this point of view I nevertheless feel entirely justified in a representation of the subject for it appears to me that Halsted overshot the mark in his conclusions so that while the textbooks copy his conclusions the practical surgeon soon realizes the incorrectness of the teaching and therefore perhaps tends to react away from that which is correct.

Before describing my experiments writes Halsted (8) I wish to call attention to certain points relating to the anatomy of the intestinal wall a knowledge of which is of the utmost importance to the surgeon who performs intestinal sutures. In looking through the literature of intestinal suture I cannot find that anyone has

called sufficient attention from a surgical point of view to the structure of the different coats of the intestine particularly to their physical properties. Indeed the descriptions in surgical text books as well as in monographs and articles treating especially of intestinal suture and the drawings which are frequently inserted to elucidate the subject lead me to believe that the current ideas among surgeons are not only incomplete but absolutely incorrect as regards some important details in the structure of the intestinal coats. If these errors related to matters of only histological interest their practical bearing would be very slight but my experiments have led me to attach great weight in the successful performance of enterorrhaphy to an accurate knowledge of the thickness and physical characters of the submucous coat of the intestine and I am not aware that the importance of this coat in connection with this operation has hitherto been emphasized.

The old views of Jobert and Lembert as to the structure of the intestinal wall seem to have been adopted by modern surgeons with little or no modification. The peritoneal coat for instance is believed to be thick enough and sufficiently strong to hold a stitch and the existence of the submucosa for us the important coat has been generally ignored.

All of which is as I see it eminently true and nearly as true today (5) in regard to the understanding by the surgeon of the true state of affairs—especially by the young surgeon just starting out to make a name by the usual route the invention of a new method of intestinal anastomosis—as when Halsted wrote the above words or as when a few years later he wrote (9). About three years ago I endeavored to emphasize the importance of the submucous coat in operations upon the intestine but only succeeded in attracting attention to the quilt or square stitch which I still employ in all sutures of the intestine.

In his earlier paper Halsted goes on to say (8)

Fig 1 kindly drawn for me by Dr. Wall is a diagram of the wall of the dog's intestine and is intended to represent accurately the relative thickness of the several coats. The serosa is prolonged beyond the outer muscular coat to emphasize its thinness. Between the submucosa and glands of Lieberkuehn—in other words between it and the lumen of the intestine—practically nothing intervenes and literally nothing but the two layers of muscularis mucosæ and fibrosa mucosæ respectively. Fully two thirds of the thickness of the wall of the intestine is mucous

FROM THE SURGICAL CLINIC UNIVERSITY OF PARIS

HYSTERECTOMY OF THE FUNDUS

BY PROF. DR. P. LECÈNE AND G. DALLAINES, PARIS, FRANCE

In 1922 we described under the title of *Hysterectomy of the Fundus* an operation in which the fundus of the uterus and both tubes are removed and one ovary or at least a considerable part of the normal ovary is left. The guiding principle of the operation is to preserve menstrual function and so avoid the symptoms of premature menopause which generally follow total castration in young women.

In 1895 Zweifel proved by a study of patients operated upon that the preservation of one ovary and a part of the mucous membrane of the body of the uterus is enough to keep up menstruation and by these observations he opened the way for a new operation in conservative gynecological surgery. Among the surgeons who practiced this operation later and published their results are Werth, Pfannenstiel, Cohn and Duehrssen in Germany, Kelly in America, Bertino and Spinelli in Italy, and Alban Doran in England. Since 1908 Beuttner of Geneva and his pupils have been particularly interested and have published a number of articles on this method of operation.

But in spite of all these articles half the surgeons still know very little about hysterectomy of the fundus although its results are more than encouraging.

According to our opinion and that of the other surgeons cited above fundal hysterectomy is not intended to replace other conservative methods in gynecological surgery. And it is particularly to be emphasized that unilateral removal of the diseased adnexa and enucleation of fibromata that can be enucleated are excellent operations when the rest of the genital tract is normal and their justification is proved by the innumerable cases in which pregnancy has followed these operations.

As a matter of fact fundal hysterectomy is intended for much more extensive lesions. It is indicated in all the anatomical lesions which necessitate the removal of at least the two tubes and a large part of the body of the uterus. In these cases the majority of surgeons perform hysterectomy by the usual methods and try later to palliate the symptoms of the menopause by glandular opotherapy, a method of treatment which is often ineffectual or at least incomplete.

Other operators have tried to prevent the development of these symptoms by preserving one ovary. This method is being used less and less for it has many disadvantages such as painful ovary and hæmatocele of the ovary and besides that it does not prevent the symptoms which it is designed to control.

Experience has shown that in order to prevent these symptoms menstruation must be kept up. Our observations show that as a general rule the intensity of the climacteric disturbances is inversely proportional to the copiousness of menstruation. By preserving a healthy ovary with a good blood supply and a considerable part of the mucous membrane of the body of the uterus fundal hysterectomy makes it possible to maintain menstrual function and attain the desired effect.

We will study in succession the indications and contra-indications of the operation, the technique and the end results.

INDICATIONS AND CONTRA-INDICATIONS OF FUNDAL HYSTERECTOMY

The typical indications for fundal hysterectomy are in our opinion the following:

1. Fibromata of the fundus of the uterus that cannot be enucleated.

Severe metrorrhagia due to hæmorrhagic endometritis without inflammatory lesions of the adnexa.

3. Certain more unusual cases such for example as extra uterine pregnancy with lesions of the tube of the opposite side and an ovary that can be preserved.

In these three kinds of cases the indication for the operation is clear (a) if the woman is young enough to justify the result aimed at (there is little advantage in a conservative operation after 40 years of age) and (b) if there is a healthy ovary and a lower segment of the uterus that can be utilized.

4. Bilateral cystic and adherent adnexitis which resists medical treatment. This is the most frequent indication but it is also the hardest one to establish.

As a matter of fact in the presence of bilateral lesions of the tubes when the uterus appears macroscopically to be healthy the surgeon is

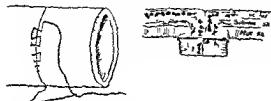


Fig 7 The manner of laying a Cushing stitch showing the area of potential infection (shaded) earned by the suture and how it is covered in as the stitch is pulled taut in cross section the course of the stitch through the walls

be bad surgery or not to penetrate the intestinal lumen it is done in the great majority of intestinal stitches even when one is trying to avoid penetration of the lumen. I personally cannot lay a stitch in the dog's intestine into the submucosa without penetrating the deeper layers of the mucosa and I am convinced that unless the submucosa be caught in the stitch the suture is unreliable and cannot even be pulled tightly enough to insure good apposition and certain hemostasis.

A study of Halsted's work makes one wonder just how often he himself succeeded in picking up only a thread of the submucosa. In some of the remarkable descriptions of the work of his school (14) penetrating stitches were found. Writing of his 35 years of work on this subject Halsted says (11) it is possible at least in experiments upon the dog, to have another constant factor—viz the depth to which the stitches penetrate. Here we see what appears to be a qualification in Halsted's own mind of the extent of the applicability of his teaching to species other than the dog. The consideration is important that the intestine of the dog differs from the human intestine and we must always bear in mind that the experiment on the animal has no object except as the results be applicable to the human being.

Again in discussing a method called A bulk head suture of the intestine Halsted wrote (10)

Advantages of the method. It is aseptic except as contamination may occur from the stitches which of necessity or by accident have been carried into the lumen of the intestine.

Our own futile attempts to accomplish this laying of a suture into but not through the submucosa lead us to the conclusion reached by all practical surgeons but expressed by but few. We agree entirely with Binns (1)

Lembert's suture.—This is the basis of almost all methods of intestinal suture. Its aim is to close an intestinal wound by turning the cut edges inward and bringing the serosa of one side into

apposition with that of the other side. Halsted has shown that it is wise to include the submucosa in the stitch. When a too sharp needle is introduced through the serosa and the musculosa its advance is easy, but when it reaches the submucosa a slightly increased resistance is perceptible. It is said to be easy to pick up some of the submucosa on the point of a needle without penetrating the mucosa. The author has frequently endeavored to insert Lembert sutures involving the serosa and musculosa alone but they always tore out. The picking up of a few fibers of the submucosa without letting the needle pass into the mucosa seems to be an 'indescent dream' if anyone doubts this let him try to sew two sausages together without touching the contained meat with the thread (sausage casings consist of the submucous coat of the gut). The blood vessel lies in the submucosa and in suturing unless the thread is passed under the vessels (i.e. nearer the mucosa) the stitches will exercise no pressure upon them and thus serious hemorrhage may and sometimes does occur. In inserting sutures, the surgeon should see to it that each stitch embraces firm tissue and will not cut out and that each stitch goes under any visible vessel in its track. If these two rules are observed good results will be obtained no matter if the thread does pass through the deeper layers of the mucosa. The author knows of one or more cases in which the operator took special pains to insert the sutures through the serosa and musculosa alone and nearly lost the patient from hemorrhage.

These facts are known to all perhaps (5) yet have not seeped into the pages of most of our text books. Thus Connell states (4) Because of the relative size of the needle and the submucosa any stitch which includes part of the submucosa must perforate or be lacerated. If it does not include the submucosa the stitch is unreliable because insecure. The stitches which penetrate the submucosa are the weak point from an anastomotic standpoint but are the strong part of the operation from the standpoint of security.

Or as I have often expressed my belief to my students I suspect that more patients have been killed by sutures which did not penetrate the mucosa than have been killed by penetrating stitches.

If we now agree that the submucosa is the only dependable layer surgically of the intestinal wall and further that it must be included in the sutures because it carries the blood vessels and hemostasis must also be obtained by our suture if we agree that such a stitch cannot avoid penetrating the deeper layers of the mucosa



Fig. 3 Suture of the stump of the uterus

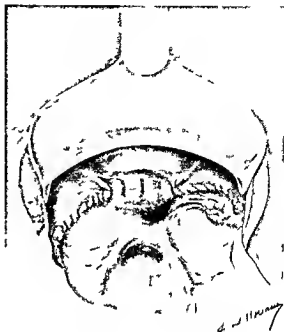


Fig. 4 Complete suture of the stump of the uterus and the broad ligaments

upon and the less affected side (the one on which the ovary is normal) determined the operation is begun on that side. The fundus of the uterus is caught with forceps and pulled so as to stretch the adnexa of the side on which the ovary is to be left (Fig. 1). On this side it is necessary to respect the upper pedicle of the ovary. The tube is therefore lifted and the vessels at the level of the ovary caught with forceps in the mesosalpinx two or three pairs of forceps are enough for the securing of hæmostasis which is carried out under control of the eye in the cases in which the mesosalpinx is still transparent. The mesosalpinx is cut above the forceps and the tube freed from the infundibulopelvic ligament to the horn of the uterus (Fig. 1).

On the opposite side the adnexa are removed as in a subtotal hysterectomy after any existing adhesions have been freed but in general if it is possible we think it is preferable to keep the round ligament intact as it may serve for peritonization. In that case incision will be made between the ovary and the ligament as is shown in Figure 2 (left side).

When the two adnexa are freed and remain attached only by their uterine pedicle a wedge shaped section of the fundus of the uterus is

performed. Before this is done a pair of forceps is placed on the uterine artery below the plane of section at each side of the uterus.

When should the wedge shaped excision of the uterus be performed? In Figure 3 we have shown the ideal and most economical section, that advocated by Beuttner and Kelly. The section is wedge shaped with its base in the fundus and its apex in the cavity. The base is bounded in front by the insertion of the round ligaments. Therefore the most diseased part of the mucous membrane is removed that is the fundus the cornua and the interstitial part of the tube.

But we think that a more extensive excision can be made. Particularly in the case of a uterus enlarged by metritis with a broadened fundus such a resection would be too economical and would involve the risk of leaving some very badly diseased mucous membrane which would be a source of possible trouble later. So in these cases we practice a cuneiform resection which removes all the fundus of the uterus including the insertion of the round ligament but leaving intact a segment of the uterus at least 3 centimeters high above the isthmus.

Hæmostasis of the large vessels being assured by ligature the uterus is sutured (Fig. 4). This

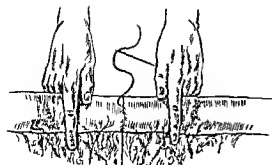


Fig. 10 The method of utilizing the fingers of an assistant to control the intestine

answered by this consideration of not exposing the peritoneum to the spread of infection along the thread. With the exception of the Connell stitch interrupted stitches must be tied on the outside the knot usually precludes this complete burying of the stitch. I have also never been able to attain as complete approximation with an interrupted stitch and further since one of the objects is to obtain hæmostasis it seems to me that a more reliable result in this respect is to be attained with a continuous suture.

The method for end to end anastomosis which years of teaching have led me to adopt is as follows. I do not claim it to be the best method but I have found it a method which beginners can use one which gives them an idea of the basic principles as I have set them forth.

Since the edges of the intestine must be approximated and hæmostasis must be secured I use two rows of sutures the first one being frankly for approximation and for hæmostasis. Since I can see no object to be attained by turning in very much of the gut wall and many objections to such a procedure I unite the cut edges by a mattress stitch which turns in the edges of the V of the mesenteric attachment in order to make sure of this weak point and then continue this same thread as a stitch which I have called the baseball stitch because it is laid in the same fashion as is the stitch which holds the cover of a baseball passing in and out between the edges turning them neither out nor in (Fig. 9). It is the stitch advocated by Schmieden (5) for closing the anterior edge of the lateral anastomosis under the name of the old fashioned postmortem suture. Since however American surgeons perhaps unfortunately are more familiar with the baseball diamond than with the postmortem room the term I have chosen seems to me to convey a more definite impression to their minds. It is a stitch

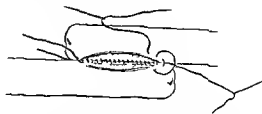


Fig. 11 The lateral anastomosis

which I would use in no other place in surgery. I would not use it in the lateral anastomosis. This suture line is then inverted and buried by a continuous right angle Cushing stitch in which in turn the Cushing suture itself is buried as completely as possible.

A practical point in the use of the Cushing stitch is that the needle should be inserted into the opposite wall not at a point exactly opposite its exit from the tissue but at a point toward the middle of the bite last taken. This insures a more even drawing together of the tissues and a more complete burying of the stitch (Fig. 7).

In doing this operation I do not use clamps but control the intestine by using the fingers of an assistant as clamps (Fig. 10). Perhaps the main object in doing this is to keep the assistant happily employed and to prevent him from constantly rubbing infection into the peritoneum with gauze sponges. After the anastomosis is completed the wound area can be gently cleansed blood clots which will have formed by that time if they have been given an opportunity to form can be gently picked off and the incessant damage wrought upon the delicate peritoneum by a zealous assistant has been avoided.

The lateral anastomosis is accomplished by following the same principles first a continuous Cushing stitch brings the two portions of intestine into juxtaposition. The opening is made the cut edges lying side by side (posterior edge) are approximated and hæmostasis is attained by a running overhand stitch. This is continued around the anterior edge as the Mayo stitch which serves to turn in the edges which are rolling out and which secures hæmostasis. The end of the first the continuous Cushing stitch is continued over this stitch of the anterior cut edges (Fig. 11).

It seems to me that the problem of the choice of an end-to-end or a lateral anastomosis rests entirely upon the principles thus far discussed and is to be solved solely by a consideration of them. In the first place it is to be noted that experimental workers seem to prefer the end-to-end the majority of clinical workers the lateral

When the opposite angle of the uterus is reached the suture is continued simply peritonizing the ligatures of the broad ligament with the round ligament and the infundibulopelvic ligament which has previously been ligated.

When the suture is finished the retrovesical peritoneum covers the stump of the uterus like a hood. The rest of the operative technique does not present any special features. Abdominal drainage is of course possible. We have used it very rarely for we are coming more and more to use this operation only in non infected lesions.

RESULTS

Immediate results. We have reported 2 cases of postoperative death. We think as we have said above that in order to keep for fundal hysterectomy that benignant character which all conservative operations ought to have as a matter of principle its indications should not be extended too much. And the most painstaking care should be exercised to attain an absolutely perfect hæmostasis. If these rules are observed the surgeon will find that the results of the operation are very good and convalescence uneventful.

Late results. Among our 130 operations hysterectomy had to be performed later in 2 cases. We have not been able to obtain exact details in regard to 1 of these patients. The other had a genital tuberculosis and in this disease we do not think conservative operations are indicated. We have seen 7 of our patients from 1 to 6 years after the operation.

We examined the organs left in place systematically in all of them and studied menstruation and the possible symptoms of premature menopause.

CONCLUSIONS

1. *Condition of the pelvic organs.* Bimanual examination after fundal hysterectomy shows a normal cervix and a small mobile and painless body in anteversion. It is unusual to find a metritic discharge (4 cases out of 72). This metritis localized in the cervix is easily treated. The

remaining ovary is generally painless. It is frequently large and can be felt on palpation in the cul de sac. Very rarely it is the site of vague and not very serious pain at the time of menstruation. Bladder function is absolutely normal.

2. *The menstrual function.* All the patients whom we have seen continued to menstruate after the operation. Two patients aged 42 and 47 had already reached the normal menopause and no longer menstruated. We have said above that after 40 years of age the benefit derived from fundal hysterectomy is not very great. In the great majority of cases the menstruation was less copious than before. It is painless. Only 5 patients complained of some menstrual pain and they had had pain before the operation.

3. *Symptoms of the menopause.* In our series 90 per cent did not show any symptoms of the menopause after the operation, such as flashes of heat, obesity and changes of disposition. Only 6 patients complained of symptoms, flashes of heat, slight increase in weight, fatigue, etc. some of them at the time of menstruation, some of them continuously. These symptoms were slight enough so that they did not interfere in any way with the patient's work.

SUMMARY

1. Fundal hysterectomy makes it possible to preserve menstruation and avoid to a very great extent the symptoms of a premature menopause.

2. The operation is indicated if the woman is young enough (less than 40) and it is possible to preserve a healthy ovary and a part of the body of the uterus.

3. The operation is contra indicated if the lesions have not long since passed the acute stage and if the pelvic peritoneum has been changed by serious adhesions or suppurative perisalpingitis.

4. Hæmostasis and perfect peritonization are the essential steps of the operation and they must be effected with the greatest skill.

5. The mortality of the operation is low (2 cases in 130) and it can be lowered still more by a better choice of cases.

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4 Hemostasis and perfect peritonization are the essential steps of the operation and they must be effected with the greatest skill.

5 The mortality of the operation is low (2 cases in 130) and it can be lowered still more by a better choice of cases.

etc. have been failures. I know of none here or elsewhere which have met with any measure of success.

The least harmful adhesions are those with the free edge of the omentum. Adhesions with neighboring loops of intestine are the most harmful. Adhesions to the omental base might be very troublesome, causing a pull on the stomach. Therefore I have advised that the operation be completed by placing the free omental edge around the site of the anastomosis, holding it in place by a single delicate stitch through the mesentery. I have never seen trouble result from such directed adhesions. I have seen trouble enough from those left to chance. But even in these latter, the most remarkable thing is Nature's ability, sometimes to continue an apparently undisturbed function in spite of such abnormal conditions.

The main objection in my experience to the lateral anastomosis is that it offers such an extensive operative field for the formation of adhesions. The entire exposed length of the suture line and both invaginated bowel ends form surfaces for attachment of any other abdominal organ conveniently near.

Were it not for the peculiar tendency of the omentum to creep into the dimple formed by the invaginating of the end of the bowel by a purse-string suture, I should conclude from my experience that adhesions are the measure of the transfer of infection from the bowel lumen to the peritoneal surface. Perhaps the omentum has two separate ways of becoming adherent: a tendency to force its way into unnatural crevices, as into a hernial sac, and a tendency to cover infection which is progressing toward the surface.

My reason for suspecting infection as the cause of adhesions is based upon the fact that I have done end-to-end anastomoses which were followed by no adhesions at all, and in which there must have been a raw uncovered surface even greater than is found where serosa is brought into apposition with serosa.

The anastomoses were performed in the following fashion: The serosa and the two muscle coats were dissected off to the submucosa. On the one end the separation was continued a little way under the muscularis so that a little flap was formed. This cannot be very long else it will become gangrenous. The two ends were then brought together by a stitch as shown by the diagram (Fig. 13), the stitches being laid deep in the angle between submucosa and muscular coat so that when drawn into position the little flap came to lie over the line of suture and was held

in place by a very delicate suture which involved only the muscle coats. This differs little from Shoemaker's suggestion except that his sutures pass through all the coats and emerge on the surface of the peritoneum. I have endeavored to cover a stitch which I know to be infected and which I know will act as a seton by capillarity or direct growth or any way you will with a little flap which is held in place by a delicate approximating stitch which I know will not be infected. The raw edge of muscle must become covered with the same fibrinous deposit as characterizes the healing of the ordinary suture line. Yet I have in a fair percentage of cases succeeded in obtaining a result marked by no adhesions at all. But the method is not a practical method.

Therefore I say that from my own experience I believe that the adhesions represent the effort of the mesothelial cells of whatever organ is adjacent to control the spread of infection. Since I believe that the operation cannot be aseptic because the stitches must penetrate to infection if they are not to give way and precipitate disaster, and since to my mind the adhesions represent Nature's way of controlling the spread of this infection, I believe we are justified in utilizing this provision of Nature in such a manner as to do the least harm—to use the free edge of the omentum and to know where these adhesions will form.

How shall the refinement of the art of surgery be accomplished, this development of a more perfect technique which I have mentioned as being in my opinion one line along which we may expect the future of surgery to improve? There are two ways by which more finished products may result from mechanical processes. The first is by the methods of mass production, by which by means of the development of men skilled in the management of highly specialized machines, the separate parts entering into the finished product are produced in a quantity and with a perfection impossible of attainment by one single worker. The other is by the development of more skilled craftsmen in case the product must represent the skill and labor of a single individual. Surgery is one man work; the nearest approach to factory methods in intestinal anastomosis was represented by the Murphy button.

But surgery must ever remain among the old handicrafts where methods become stabilized on basic principles because of the physical limitation of the materials with which the craftsman deals and because one workman must finish the entire work. Therefore refinement of technique as in all other handicrafts since the beginning of time

THE TECHNIQUE OF THE SURGERY OF THE GASTRO-INTESTINAL TRACT

BY J F SWEET A M M D S C D F A C S N E W Y O R K
F I S S O F S A C I R E A C H C O U N A T Y M I C I E

A DISCONTENT with things as they are and a constant effort to make things better constitute the basic drive in the human soul which has resulted throughout the centuries in our present form of civilization. It is perhaps but natural that this urge more often takes the form of a search for the new—the untried—the glittering will o' the wisp floating just ahead than that it should assume the burden of a patient consistent effort to improve the already known to increase the efficiency of long accepted procedures.

In the field of surgery this search for the new thus unquestioning acceptance of the old seems particularly striking. We have all seen ventures into new fields heralded as the harbingers of a new era in surgery—ventures which perhaps bring temporary fame and prosperity to the originator yet which have wrought no permanent change in the stream of surgical affairs. The real progress of surgery has always depended upon the workers who have added a little here and a little there to the diagnosis and treatment of everyday pathology.

The technical methods of those surgical procedures which have survived the test of daily practice have been simple methods; they are such that the surgeon of average ability can master them. This is because the instruments and the materials with which the surgeon works are simple—a knife, scissors, a needle and some kind of thread—used with a material which does not lend itself as readily to fine sewing as does a bit of cambric and the methods must remain simple and comparatively coarse. This is not a criticism of surgery; for the nature of the material with which the surgeon works—the tissues of the human body—cannot be changed. We have to go no further afield than to the art of dentistry to find an instrumentarium far surpassing in delicacy that of the surgeon and an array of materials—rubber, pure metals, alloys, amalgams, cements, etc.—requiring a mechanical technique far more exacting than that needed by the surgeon.

This technical simplicity of surgery does not mean that operative procedures must be kept simple in order that the average surgeon may master them as we often hear. It means that the procedures that stand up under the test of everyday use will necessarily be simple because of this

simplicity of tools and materials which characterizes the technique of surgery.

If surgery is to progress in what direction? We believe that the future of surgery will be marked by improvement in the details of existing procedures rather than in the discovery of new methods or the opening of new fields for surgery. The greatest advance will lie along the line of the earlier diagnosis of disease, the development of preventive surgery, as for example the development of the precancerous surgery of the breast in place of the present attempt to snatch back the woman with one foot already in the grave.

Another field for advancement seems open to cultivate the art of the watchmaker to develop an eye and a hand which can lay three stitches where but one will go at first in other words to refine our present methods. In order to attain the refinement of technique there must come first a true understanding of the materials with which we are working, a true measure of physiological and surgical values, an understanding of the function not of organs as a whole but of their component tissues. The function of each component must be understood since the function of the whole is but the sum of the functions of the component parts and the restoration of function is the prime object of all surgery, but also the mechanical possibilities of each component tissue must be understood so that it can be treated to the best mechanical advantage.

With this general idea in mind it seemed that it might be worth the effort to consider the problem of the technique of the surgery of the gastrointestinal tract to analyze the material available and the objects sought in each step of the operation and the means best suited for attaining that object with the material at hand. For the principles of the operation of opening and closing an infected cavity within the peritoneal space are basic to all intraperitoneal operations. A careful study of the reactions of men trained in different schools of medicine—men who have as undergraduates followed different textbooks of surgery—leads to the inevitable conclusion that few, if any, have even thought of the reasons why each step of an operation is done as it is done and what the object of each step is, or if it might be accomplished better by some different technique.

A METHOD FOR GASTRO-ENTEROSTOMY WITH A TRANSVERSE JEJUNAL INCISION

AN EXPERIMENTAL STUDY¹

BY THEODOR S. MOISE, M.D., F.A.C.S., CUSHMAN D. HAAGENSEN, M.D., AND EDWARD C. VOGT, M.D.
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INTRODUCTION

ALTHOUGH the success of any type of gastro intestinal anastomosis is largely dependent on its mechanical efficiency too little attention has been given to certain faults inherent in the mechanics of the usual side to side gastrojejunostomy. These deficiencies are in part at least due to the division of the circular muscle fibers throughout the length of the stoma.

Cannon and Blake (1) made an extensive experimental study of the routine side to side method. They repeatedly noted that food was forced through the patent pylorus to enter the stomach again via the proximal loop of the gastro jejunostomy. This circulation of food was seen especially when the stomach was stretched either by large amounts of water or by the application of pressure to the abdomen after moderate amounts of food had been given. They explained this phenomenon by the "valve like" action of the anastomosis. When the wall of the stomach is stretched separating the edges of the opening into the jejunum the intestine becomes drawn tightly between them. Thus the intestinal wall forms a flat covering to the stoma and the openings into the intestine become merely narrow slits (Fig. 1A). The slit on the proximal side of the stoma permits food which circulates via the pylorus and duodenum to return into the stomach but both slits offer a valve like hindrance to the egress of food from the stomach via the stoma. The more the gastric wall is stretched the more effective these valves become. The phenomenon was also demonstrated in the excised stomach by filling it with water.

Cannon and Blake did not believe that their failures were due to this valve like phenomenon. They ascribed the cases of obstruction in their series of experiments to the formation of kinks which were invariably located just distal to the point of attachment of the intestine to the stomach. They pointed out that sharp turns in the intestine under normal conditions are readily straightened out by the push of intestinal peristalsis.

However at the stoma of the side to side gastrojejunostomy the circular muscle fibers of the gut have been cut. This interruption of the circular

fibers makes it impossible for peristalsis to be effective at the angulation (Fig. 2) in the jejunum at the distal end of the anastomosis and hence the force which normally would push the mass of food along and straighten the kink is lacking.

Various modifications have been suggested to avoid these defects in the side to side gastro jejunostomy. Kelling (2) thought that kinking was produced by making the stoma too large so that when the stomach was stretched and the stoma further enlarged a spur of intestine might project into the gastric cavity. Case (3) suggested that kinking might be entirely prevented by attaching a few centimeters of jejunum beyond the distal end of the stoma to the stomach wall.

Moise and Harvey (4) presented a method for anastomosis of the stomach and jejunum after a partial gastrectomy wherein the jejunum is incised transversely rather than longitudinally and the end of the stomach is anastomosed to the end of the jejunum rather than the end of the stomach to the side of the jejunum as in the frequently used Polya operation. The theoretical advantages of such a procedure over the usual end to side or side to side anastomosis are several. The procedure is an end to end anastomosis and should have the mechanical and physiological advantages that are generally conceded for this type of operation. In contrast with the Polya type of gastro jejunostomy one avoids cutting the circular fibers over a wide area and accordingly there is no interference to peristalsis and no opportunity is afforded for the formation of an atonic dilated pouch opposite the stoma. The size of the stoma is approximately that of the cross section of the jejunum which is obviously the maximum possible size of the effective lumen in any type of anastomosis even though a long longitudinal incision into the intestine gives a seemingly larger opening. After this end to end gastrojejunostomy the two loops of jejunum naturally gravitate downward which is the optimum position for the maintenance of a patent stoma, while this same tendency for the loops to drop down after the Polya anastomosis may tend to kink and partly occlude the lumen.



Fig. 1 Mesothelial cells from surface of omentum in tracellular cement substance stained by argentic nitrate X300 (From Piersol 23)

of the mesothelial cell possibly 25 micra or 25 thousandths of a millimeter in width. If we place the diameter of the smallest particle visible to the naked eye at 50 micra then we have a serous covering of the intestinal tube one half as thick as the smallest visible thing containing on the outside delicate cells and in addition the entire structure is transparent.

Is it not then proper to suggest that we cease talking of a serous stitch in gastro intestinal surgery? Does not the consideration of the delicate intangible invisible structure before us indicate that we should cease the comparison with a cow's test in the suggestion that we milk the contents of the intestine away from the field?

The physiological value of the serous membrane consists in its function of offering a smooth surface further made slippery by the secretion or activity of these mesothelial cells so that the organs may slide freely over one another.

The surgical value of the serous membrane is paramount and consists in two properties possessed by it. The first is that when two surfaces covered by mesothelium are pressed together the mesothelial cells disappear the underlying fibrous components of the stroma grow together or as some think the mesothelial cells themselves transform into fibrous tissue and the surfaces become firmly united. It is by such a process that the mesenteries form the original peritoneal covering of the posterior portion of the body of the pancreas disappears that surgical wounds heal and that adhesions the undesired result of abdominal surgery arise.

The second property possessed by this membrane which is of value to the surgeon is its power to resist infection. A suppurating wound of the abdominal wall may extend to the peritoneum, but will be stopped there. The infection accompanying all intestinal operations is disposed of by this property of the mesothelial cells. The exact



Fig. 2 Involuntary muscle from intestine several isolated fiber cells are seen below X 00 (From Piersol)

mechanism by which the mesothelium accomplishes this function is an unfinished problem that the mesothelial cells can act as phagocytes is known. The lack of serous membrane over that portion of the intestinal tube lying within the V of the mesenteric attachment makes this portion especially difficult surgically and compels especial care and attention to this point. Infection occurring here really extraperitoneal may gain such headway that it can break through and invade the peritoneal cavity in so great a mass as to overpower the resisting property of the mesothelial cells.

The problem confronting the surgeon becomes one of handling a structure he cannot see by the aid of structures he can see and handle. The things he must not do are more evident than the things he must do. He must avoid all injury to these delicate cells. Clamps sponges if used at all must be used with an appreciation of the delicacy of the cell covering of the intestine. Salt solutions must be made isotonic with these cells. It is poor practice to expose more than is absolutely necessary to the drying effect of the air particularly the hot air of a surgical clinic.

The serous membrane covering the intestine is like the mind of a child delicate invisible intangible a thing which must be treated with all gentleness protected from all sorts of harmful agents directed into the paths in which we would have it go by the moulding influences of gentle pressure not to be pulled and hauled and scraped else the seeds of infection will take deep root and at best it will attach firmly to things over which it should normally slip.

Immediately below this incomplete tube of serous membrane is a complete tube of longitudinally arranged muscle cells. Unstriated smooth pale unstriped or involuntary muscle as it is variously designated consists of structural units known as the fiber cells. These are delicate spindle often prismatic elements whose tapering ends fit between the adjacent fiber cells.

The individual fiber cells (Fig. 2) are held together by an exceedingly delicate investment of connective tissue fibers both white and elastic which surround the muscle elements and in cross sections appear as lines formerly interpreted as

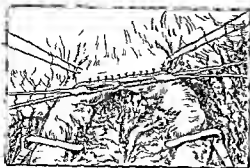


Fig 4 The crushing clamps have been separated and the jejunum has been attached to the stomach by a posterior row of interrupted silk sutures

edges of the jejunum are excised. An incision is made into the stomach of the same length as the jejunal opening and the anastomosis is completed in accordance with the operator's preference. In these experiments a continuous through and through catgut suture of No. 6 chromic was inserted in the middle of the anastomosis posteriorly and was carried in either direction. This suture was continued around the angles as a continuous inverting mattress stitch. The anterior layer was reinforced with interrupted Lembert sutures to complete the anastomosis.

On completion of the anastomosis the jejunal loops gravitate downward at right angles to the stomach without kinking and in the optimum mechanical position (Fig 5). The separate openings in each loop admit the index finger and thus afford a stoma approximately the size of the cross section of the jejunum and slightly larger than the normal pylorus.

DISCUSSION

The functional results in the series of 10 end-to-side anastomoses were uniformly good. The animals lost some weight but not more than normal animals kept in cages. The roentgenographic studies showed that the stomach usually began to empty immediately after feeding. The emptying was never precipitous. The average emptying time for the series was 5 $\frac{1}{4}$ hours, which is approximately the same as that of a normal dog under similar conditions. In animals without pyloric exclusion the emptying was via both the pylorus and the stoma.

Finally examined *in situ* the anastomoses looked much as they did upon completion of the operation. The stomach was never dilated. The loops of jejunum hung directly downward in the most favorable mechanical position (Fig 5).

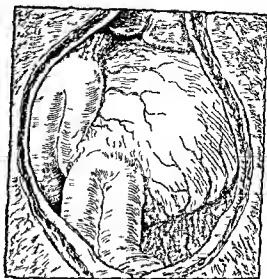


Fig 5 The drawing illustrates a gastro-enterostomy with transverse jejunal incision as it appeared *in situ* after complete healing. The jejunal loops hang directly downward tending to maintain the patency of the lumen.

There was no evidence of valve-like action or kinking. Upon removal the specimens showed a patent lumen about the size of a cross section of the normal jejunum.

In contrast there were three poor results in the series of side-to-side anastomoses. In the 7 successful experiments the results were good with an average emptying time of 5 hours and 10 minutes (Fig 6). The unsuccessful instances (3 in 10) showed definite evidence of retention both by roentgenographic study and at autopsy. In 2 animals the obstruction progressively became more and more marked and was accompanied by vomiting and emaciation. At approximately 1 month and a half after operation fluoroscopic examinations showed that the stomachs were greatly dilated and full of fluid. They did not empty perceptibly within 6 hours and after 3 days showed definite retention. When the dogs were killed the stomachs were found to be greatly distended (Fig 7). The stoma in each case was much enlarged and the opposite intestinal wall where the circular muscle fibers had been cut was markedly stretched and ballooned out in line with the stomach wall illustrating the valve formation described by Cannon and Blake.

The loop of jejunum gravitated downward from the angles of the dilated stoma producing a moderate angulation of the gut at the distal end of the anastomosis. The angulation was not as



Fig. 1 Mesothelial cells from surface of omentum in trabecular cement substance stained by argentic nitrate $\times 300$ (From Piersol 15)

of the mesothelial cell possibly 25 micra or 25 thousandths of a millimeter in width. If we place the diameter of the smallest particle visible to the naked eye at 50 micra then we have a serous covering of the intestinal tube one half as thick as the smallest visible thing containing on the outside delicate cells and in addition the entire structure is transparent.

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The individual fiber cells (Fig. 2) are held together by an exceedingly delicate investment of connective tissue fibers, both white and elastic which surround the muscle elements and in cross sections appear as lines, formerly interpreted as

has no tendency to produce obstruction but on the contrary maintains the patency of the lumen

In the experiments herewith reported a comparison is made between the usual gastrojejunostomy with longitudinal jejunal incision and a new method with a transverse jejunal incision. This study reveals a practical demonstration of the above described theoretical advantages of the transverse incision. In a series of 10 dogs this procedure has proved to be mechanically and functionally satisfactory.

In contrast a comparable series of 10 gastrojejunostomies with the usual longitudinal jejunal incision resulted in 3 cases of obstruction due to

the formation of valves already mentioned. A preliminary report of the clinical application of this procedure will be made at an early date.

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Fig 5 Photomicrograph of a section from the middle portion of the small intestine of the human being together with the end of a needle a bit of No 00 catgut of No 4 silk and of a human hair. The intestine was fixed and hardened in the usual manner.

the rest of the building hangs in the normal intestine so must the surgeon repair it as a frame work giving it the necessary strength at the line of repair to carry this burden of support until complete healing has brought complete restoration.

Within this supporting tube are three further tubes a muscularis mucosae a stratum fibrosum or a sort of basement membrane for the mucous membrane and the mucosa itself. The purpose of the muscularis mucosae is to throw the mucous membrane into folds perhaps actually to move the mucous membrane so that fresh surfaces are brought into contact with the food. It is a delicate affair sometimes two cells thick not always a complete tube. Yet we find one of the best books on the subject of gastro intestinal surgery stating at the outset—the muscularis mucosae achieves its great importance from its tough structure which is peculiarly adapted to resist the pull of a stitch. It is the only portion of the intestinal wall which has this valuable quality. (7) It perhaps matters little but this statement is not true. I quote merely to show that even those who have worked especially along this line have not always been clear as to what they were doing.

The so called stratum fibrosum is a connective tissue tube upon which the cells of the mucous membrane are arranged. Like the muscularis mucosae it is too delicate to possess any physical characteristics which can be made use of by the surgeon.

The innermost tube of these several tubes of which I conceive the intestinal wall to be composed is the mucous membrane. Anatomically it is a row of high columnar epithelial cells one row deep the total surface area is greatly increased by the folding of the membrane and by

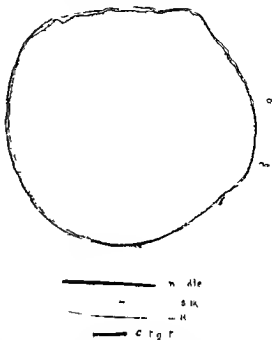


Fig 6 A piece of the same intestine as in Figure 5 fixed and hardened after filling the lumen with the fixing solution. Beside it a needle point a bit of Catgut No 00 of silk No 4 and of a human hair.

the numerous finger like projections or villi which stand out on the inner aspect of the intestine so thickly as to give the characteristic velvety appearance that is when the intestine is not dilated but is in the normal semicontracted state.

Physiologically the mucous membrane is all important it is the portion which all other parts must serve it is the excuse for the existence of the entire organ but from the standpoint of surgical mechanics it is of no use for it has no strength it can be picked off with forceps and even considering the fibrous base and the muscularis mucosae as a part of the mucous membrane we still do not have a structure capable of resisting the pull of a stitch.

The suture of the mucous membrane is therefore an impossible concept should we still teach it (5)?

From the standpoint of surgical mechanics the mucous membrane is of no use better be it said it is worse than useless for this tube of mucous membrane communicates directly with the outside world. In fact I like to think of the intestine as containing another tube within the mucous

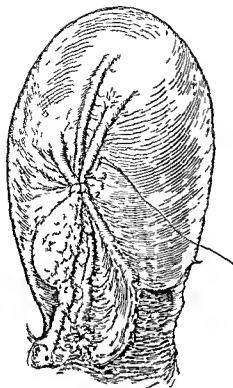


Fig 1 Diagram showing method 1

including only the round and ovarian ligaments and thereby effectually obviates the possibility of the entrance of an ovulum through the free end of the tube (suture 1). As a further precaution against a possible pulling out of the first suture an additional suture is inserted about 1 centimeter higher up so that the round ligament and the tube are united again (suture 3).

One or more superficial sutures introduced between sutures 1 and 3 conclude the procedure.

Method. The principle involved in this method is practically the same as that employed in the fixation of the inverted stump of the appendix to the cecum. The tube is severed in its mid portion or at the junction between the middle and outer thirds. The proximal cut end of the tube is then ligated with silk or silkworm gut. Then with a fine French needle a suture is inserted through the round ligament which is pulled up in a loop by means of a dissecting forceps then through the tube and again through the round ligament. By consulting the diagram it will be seen that when the ends of this suture are drawn together the stump of the tube will be buried in

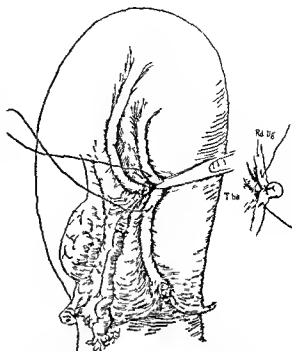


Fig 2 Method 2 When the ends of the suture are drawn to either the stump of the tube will be buried in an artificial niche produced by the posterior surface of the round ligament.

the artificial niche which has been produced in the posterior surface of the round ligament. As a matter of precaution the area where the end of the tube will rest is scarified and an additional suture is introduced in the same way through the round ligament and tube as described above. In order to make it sure that the blind end of the tube is entirely covered a few superficial sutures are then inserted through the round ligament, which roll its edges in (see insert of diagram). Whenever possible as an additional precaution the ovary is laid over the serous suture line and fixed in this position by one stitch.

All deep sutures should be made with silk in order to prevent too rapid absorption of the suture material. For the serous sutures however chromic catgut is preferable. A minor point in the technique may be mentioned here. Since a small artery which supplies the requisite nourishment runs within the round ligament the sutures introduced through the ligament should involve only its upper half.

I have in a limited number of cases employed the methods described as the procedure of choice

membrane. When the needle, therefore, has been passed through its outer third it must have entered the glands of Lieberkuhn and hence the lumen of the gut. It is an easy matter to isolate the submucosa. The outer muscular coats strip from it readily, and the mucous membrane can be rapidly scraped off with a knife. Thus obtained the submucosa is found to be an exceedingly tough fibrous membrane. It is air tight and water tight and is the skin in which sausage meat is stuffed. It is moreover the coat of the intestine from which catgut is made.

And now we come to the place where Halsted overshot the mark. A needle on being pushed vertically through the wall of the intestine meets with considerable resistance when it reaches the submucosa, and still greater resistance is encountered if it be attempted to pass the needle horizontally through its meshes. A delicate thread of this tissue is very much stronger and better able to hold a stitch than is a coarse shred of the entire thickness of the muscular and serous coats. Upon the discovery of the latter fact at which I was perhaps as much surprised as most surgeons will be at the statement of it, it naturally occurred to me that it would, if feasible, be well to include a portion of the submucosa in the suture. I soon discovered that even to the sharpened end of a needle sufficient resistance is offered by the submucosa to be easily appreciable, and that it is possible and with very little practice not difficult to pick up at each stitch a thread like piece of submucosa without incurring the danger of passing into the lumen of the gut.

In the report (a) of a demonstration before the Johns Hopkins Medical Society, December 1, 1890, Halsted republishes the drawing we here reproduce (Fig. 4); he evidently successfully demonstrated that a stitch could be laid (in the intestine of a dog) as he describes, and he drew the following conclusions:

For the performing of an intestinal suture of any kind I would emphasize the following statements:

1. It is bad surgery to employ a stitch which enters the lumen of the intestine.
2. It is impossible to suture the serosa alone.
3. It is impossible to suture unfatigably the serosa and muscularis alone unless one is familiar with the resistance offered to the needle by the coats of the intestine. Furthermore stitches which include nothing but these two coats tear out easily and are therefore not to be trusted.
4. Each stitch should include a bit of the submucosa. A thread of this coat is much stronger than a shred of the entire thickness of the serosa

and muscularis. It is not difficult to familiarize one's self with the resistance furnished by the submucosa, and it is quite as easy to include a bit of this coat in each stitch as to suture the serosa and the muscularis alone.

The trouble with all this can be seen in the picture. One cannot criticize the anatomical part of a drawing made by an anatomist so eminent as was Dr. Mall. The anatomical relationships are doubtless correct—but the needle was drawn in by a poet. In regard to this drawing Halsted writes (8). The peritoneum is so thin that one cannot represent it by the finest pencil stroke unless the wall of the intestine be magnified to a thickness of about 5 centimeters (vid Fig. 1). On this manifold magnification of the intestinal wall has been drawn an extremely fine needle in its natural size or even smaller. In fact I would welcome the finding of needles made with points as fine as this. I have placed on the picture before photographing it a needle of the actual size recommended by Halsted.

Suppose we attempt a comparative representation of the facts in the case by making a photomicrograph of an actual section of the human intestinal wall with a needle, a silk thread, a piece of catgut, and a bit of a human hair laid beneath the cover glass, equally magnified with the intestinal wall. And suppose we do this under two conditions: a piece of gut fixed in the collapsed contracted state, and a piece of the same gut filled with a fixing fluid during the hardening process, let it be distinctly understood that this second piece of gut is not dilated, simply filled.

The needles in the photographs, or strictly speaking the needle points since only a portion of a needle could be included, are the finest obtainable from the operating room of one of our large hospitals; the silk is No. 4, the catgut No. 00 iodized. Finer materials can be obtained but these are the finest to be found in the operating room of this hospital and apparently represent the finest practical materials in the opinion of the practical surgeons who use them. For the sake of the visual comparison I have placed in the photographs a bit of a human hair, which is the finest suture material practical or impractical with which I am acquainted. It is of course true that these tissues have shrunk somewhat in the processes of fixation and hardening preparatory to sectioning. This shrinkage is believed by histologists to amount to less than one half the original thickness of such tissue as the gut wall (Figs. 5 and 6).

A study of these comparative values and many experiments have convinced me that whether it

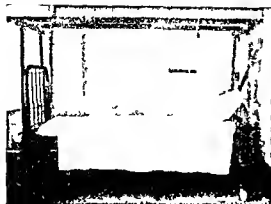


Fig. 1 Balkan frame with crossbar in place



Fig. 2 Patient in act of turning body

riorly it follows that weight bearing is possible only on the right or left side the trochanters of the femur sustaining the principal burden

The patient requires a nurse in attendance chiefly because of his inability to change his position in bed. At this period of the convalescence a constant intractable aching soreness develops in the hips and legs and finally in the entire body associated with sleepless nights and a general lowering of morale. Irritability spells of depression and crying and a state of high nervous tension often occur at this time.

A Balkan frame equipped with an overhead swinging crossbar attached to the bed enables the

patient to raise and turn the trunk and body (Fig. 2) easily assume new positions and rest tired muscles at will. With increased comfort and activity a decidedly beneficial physical effect on the tonus and strength of the musculature of the upper extremity back abdomen and legs is noted. Improvement in the mental attitude of such a patient is striking the insomnia is improved the appetite returns and a decided general improvement occurs.

For the first patient a Bradford frame was used in conjunction with the Balkan frame. This was subsequently discarded since it prevented the free range of motion possible on a flat surface.

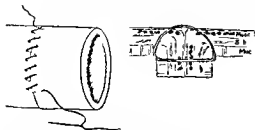


Fig 8 The Lambert suture showing the area of potential infection of the peritoneal surface (shaded) after the stitch is pulled taut. In cross section the course of the stitch through the walls

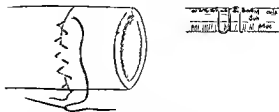


Fig 9 The baseball suture which approximates and secures hæmostasis turning the edges neither in nor out. In cross section the course of the stitch through the walls

and therefore becoming infected may we not arrive at some definite conclusions regarding suture materials types of stitch or even the choice of end-to-end or lateral anastomosis?

In the first place since the stitches must and do enter the mucosa we cannot agree to the latest fashion in this field of surgery and talk of an aseptic method of anastomosis. These are become quite the fashion (5). It seems to me however clearly improper to speak of asepsis if only one stitch penetrates the lumen and becomes infected. Nor does it help much in my opinion to assert that an aseptic operation upon the bowel is theoretically impossible yet practically attainable as does Gatch (6). Aseptic intestinal anastomosis by any suture method is theoretically impossible but the amount of contamination can be so reduced that cultures taken at the line of sutures are sterile. That is I would point out that cultures taken at the line of suture in culture media which may or may not be at all suited to the growth of the organisms showed no growth but also showed very little as to whether or not organisms which might well thrive in the peritoneal juices were or were not present. Nor can I agree with Roeder's concept (23) perfect asepsis and practical asepsis must be appreciated and differentiated.

From the standpoint of the teacher of surgery there is no permissible qualification of the term asepsis. It is a term like death one is either dead or he is not dead. There is a certain practical danger too for the less experienced may be inclined to chance an anastomosis by some such method in a case which might far better be treated by a three stage operation (1).

The idea behind these proposals insofar as it relates to the obtaining of a cleaner field is above criticism for there are in surgery as in house cleaning various degrees of cleanliness. There is one point concerning these suggestions which is not mentioned except by Halsted and that is the

fact that the length of the inturned cuff even though the cuff consist only of submucosa bears a relation to the process of healing. It lies beyond the province of this discussion to take up this point but I would recommend to the youthful enthusiast who proposes a new invention along this line to go back and read the work upon the healing of intestinal sutures by Mall and Sabin (14).

If now we admit that every intestinal stitch upon which the surgeon may rely is a penetrating stitch is infected and at best opens the lumen of the intestine so that infection may travel along it either by capillarity or if not by capillarity by direct growth along the line of the thread (3, 6) what are we going to do about it?

I believe that this problem is to be answered by employing a stitch which will lie completely buried in the wall so that if and when infection follows along it the infection will not advance to the peritoneal cavity. This can be done by using the Cushing stitch in preference to the overhand Lambert stitch (Figs 7 and 8).

And what should be the material? I believe that fine catgut should be used for this stitch we assume it to be infected and we have known for many years that an absorbable suture works better in the presence of infection than does a non absorbable suture. In our teaching we have always used fine silk simply in order to demonstrate that in the course of time this stitch sloughs out into the intestinal lumen and that if it be of silk it may take a very long time before it is cast off. The suture used for approximating the edges and securing hæmostasis may however be of silk because it is in great part exposed to the lumen of the intestine and is drawn tightly to secure hæmostasis and will therefore be thrown off much more easily than will the Cushing stitch lying buried within the tissues.

The problem of whether a continuous or an interrupted stitch should be chosen seems also



Fig 1 Case 1

Fig 2 Case 2

plication of a hot towel with good firm pressure. It is extremely important that the pedicle have a fertile vascular base because the periphery of the ulcer alone will be insufficient to insure proper nourishment of the graft after the pedicle has been severed.

In Case 2 the heel was made up of scar tissue and the posterior surface of the os calcis covered by sickly pale granulations. In order to cover the os calcis with granulations of a healthy and clean type, multiple holes were drilled into the body of that bone so that granulations might arise from the medulla and eventually cover the cortex. This plan succeeded extremely well and within a few weeks the entire area to be grafted was covered with healthy granulations.

With the heel prepared and the graft cut the foot is elevated to the anterior aspect of the thigh and the heel brought to rest upon the rubber dam. The graft is then sutured to the periphery of the ulcer and in order that the raw surface of the graft may rest securely against the granulations of the heel, two sutures parallel with the long axis of the graft are passed through it and the granulations of the heel. When these are tied the pedicled graft accurately fits the contour of the heel. In order that any secretion which might collect may have a free portal of escape a few stab wounds of small caliber are made through the graft to the underlying heel.

In Case the graft before it was sutured into place was perforated with at least one dozen holes made with a Dakin punch.

Absolute immobilization is a *sine qua non* for successful pedicled grafting. This can only be accomplished by encasing the lower half of the body in a plaster spica and because of the peculiar position of the lower extremities this plaster spica must be firmly reinforced by basswood splints. It has been found quite helpful to place the patient upon the Hawley fracture table at the beginning of the operation and after anesthesia has been induced the extremity from

which the pedicle is to be taken is fixed to foot piece with bandages while the other extremity remains free. After the operation has been completed the lower half of the table is dropped and the usual spica can then be easily applied. No dressing is placed directly over the wound excepting a sterile towel. This may be removed when the graft has to be inspected without discomfort. At the end of 10 days the pedicle may be divided first partially and within 24 hours completely, and the free end of the graft sutured with the periphery of the wound or permitted to heal under adhesive strapping. The cast is then removed.

It is extremely important to warn the patient to protect the heel with thin pads of rubber sponge when wearing a shoe. This pad inserted between the heel and the shoe will protect the insensitive grafted area from a friction burn which may easily occur without the knowledge of the patient.

The 2 cases with photographs illustrate the procedure outlined in this paper.

CASE 1 C. G. age 35 years male a porter was admitted to the surgical service of the Heekman Street Hospital November 8, 1913, and discharged January 6, 1914.

While attempting to step an elevator he missed the step and his right heel was caught and crushed between the floor of the moving elevator and the floor of the building. An ambulance brought him to the hospital immediately after the injury.

The past and family history was not relevant. Physical examination was negative except for a surgical condition which disclosed an obliquely lacerated wound about 4 inches in length resulting in a partial avulsion of the right heel down to the Achilles tendon. Roentgen examination showed an incomplete fracture of the os calcis of the right heel without displacement.

Cause The patient was removed to the operating room immediately upon admission and the wound thoroughly irrigated with saline solution for about 15 minutes then cleansed with alcohol and ether. A thorough debridement was then performed. The laceration was sutured with silk worm gut and silk and the wound dressed with an aseptic gauze.

November The wound had apparently healed without infection but the lower flap of skin covering an area of about 2 by 3 inches had become black and gangrenous.

November 19 The necrosis of skin over the heel had extended so that an area of about 3 by 5 inches was involved. The underlying granulations in areas however were fairly clean and the os calcis was visible.

December 8 The wound had closed up very satisfactorily. Granulations were healthy and exuberant, and the condition seemed satisfactory for a pedicle graft.

December 10 Operation Pedicle graft from anterior aspect of left thigh to right heel.

The patient was placed and fixed upon a Hawley table. The area of the right heel was thoroughly cleansed and scrubbed vigorously with green soap and water followed by alcohol and ether. Since this procedure caused bleed the weeping area was covered with a hot towel and pressure applied by the hand of an assistant. A full thickness

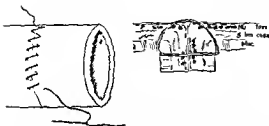


Fig 8 The Lembert suture showing the area of potential infection of the peritoneal surface (shaded) after the stitch is pulled taut. In cross section the course of the stitch through the walls

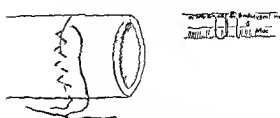


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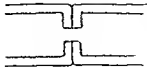


FIG. 12 The natural angle of approximation of two pieces of gut when they are laid side by side contrasted with the artificial angulation which must be produced and held by the end-to-end suture

FIG. 13 A method which gives ideal results experimentally but is not a practical suggestion

I believe this is due to the difference in the nature of the tubes with which the two groups are working. The intestine of the dog is a relatively stiff thick walled tube which gives a clumsy result as a lateral anastomosis the human intestine is actually thinner walled larger more pliable and the result of a lateral anastomosis is therefore far more workmanlike. Then too perhaps without being able to explain why the clinical surgeon prefers the lateral anastomosis because in its performance the walls lie in such relationship that they naturally fall into approximation of their serous coverings rather than having to be forced into an unnatural position by the suture as occurs in the necessary angulation at the line of turn of the end to end operation.

There seems to be a good deal of discussion of the physiological workings of an anastomosis. Probably all that Cannon and Murphy concluded () concerning the lateral anastomosis was correct that there is in the early period during which their studies were made a certain disturbance of the passage of food along the area of the anastomosis. But the fact that both animals and human beings recover perfectly after the operation shows that Nature can adapt herself to whatever disturbance may result from the lateral anastomosis. There is a highly commendable growing desire among surgeons to consider the normal physiology to devise operations which shall conform to the normal conditions yet it does not appeal to me that it is necessarily poor surgery to take advantage of Nature's power of adaptation if thereby a desirable surgical end can be attained. It is not poor surgery to transplant a nerve of less important function to one of all important function it is not poor surgery to cause a loss of all sensation to the face if by so doing a tic douloureux may be relieved. Therefore I believe that a lateral anastomosis on a thin walled gut taking advantage of the natural approximation of the peritoneal covering and the consequent good concealment of the stitches is far more logical than an end-to-end regardless of the physiology for we know that adaptation

will occur even to the point that the gut becomes in time even after a lateral anastomosis a straight tube again (Fig. 1).

That food can collect in the blind ends has really nothing to do with the operation for the leaving of such a blind end is not a part of a lateral anastomosis any more than the leaving of an unsutured hole in an end-to-end is a part of the operation.

A very important problem remains to be considered the question of adhesion formation. It has never been settled why adhesions form so readily to the line of suture. In the years of teaching I have had the opportunity to see several hundred intestinal anastomoses with the autopsy of the results both successful and unsuccessful and I have seen but few end to end or lateral anastomoses which did not show an adhesion at some point or other to at least the omentum. In many cases these adhesions were but slight and might have eventually become attenuated and separated. From these as the best results the adhesions have varied all the way up to the result in which many coils of intestine were fastened together producing sharp angulations and kinks sometimes causing death. What produces these adhesions? Are they an essential part of the process of healing?

The first step in the process of intestinal repair is the throwing out of some sort of thrombin from the wound which causes a coagulum of lymph and blood to form between the apposed surfaces of peritoneum. This fibrinous deposit may appear even before the operation is complete it should be left in place unless excessive. It may be that the adhesions occur with this fibrinous deposit before the mesothelial cells have had an opportunity to grow over it. In such a case adhesions might be looked upon as a logical sequence of operation and we would have to direct them rather than seek to avoid them.

Until such time as the process may be understood I believe that the best practical surgery will direct this adhesive process in a direction which would do the least harm. All the experiments directed toward the complete prevention of adhesions by the use of oils foreign membranes

THE USE OF MERCUROCHROME 220 SOLUBLE IN PERITONEAL AND OTHER CAVITIES FOR SEPSIS

BY RICHARD T. DAVIS, M.D. FREDERICKSBURG, VIRGINIA

THE success of mercurochrome 220 soluble in the field for which it was originally intended has led to its experimental use in many others with the result that reports are continually being made of new uses for the drug. The following is a report of a series of 21 grave surgical cases from my hospital in a period of 2 years in which I made free use of mercurochrome in 0.5 per cent and 1 per cent solutions introducing from $\frac{1}{4}$ to 4 ounces in the peritoneal and pleural cavities with excellent results. The drug thus administered does not occasion the characteristic sharp rise in temperature which follows its intravenous use possibly because its absorption is gradual and no evidence of kidney irritation was found. There were 12 cases of appendicitis, 2 cases of empyema or lung abscess, 1 case of ruptured urethra and bladder, 2 cases of ectopic gestation, 1 case of salpingitis and 3 cases of intestinal obstruction. Of the 21 patients 19 fully recovered and 2 died. In detail they are as follows:

CASE 1. B. S. white female age 17 entered the hospital November 8, 1933 with a temperature of 100 degrees F, pulse 130, respirations 6, white blood count 12,000 polymorphonuclears 92 per cent. She was found to have a ruptured appendix with free pus in the abdomen and a generalized peritonitis. The appendix was removed in the usual way, drainage introduced and one ounce of 0.5 per cent solution of mercurochrome 220 soluble poured into the peritoneal cavity. The patient's temperature rose to 102 degrees F in 24 hours after which it did not go over 100 and became normal on the fifth day. She was discharged on 4 weeks.

CASE 2. M. S. white female age 20 came with a temperature of 98 degrees F, pulse 124, respirations 30. She was found to have a ruptured appendix, free pus in the abdomen and a generalized peritonitis. The appendix was removed in the usual way, free drainage established and 2 ounces of a 1 per cent solution of mercurochrome 220 soluble was poured into the peritoneal cavity. The temperature remained low, not rising above 99. The patient made an uneventful recovery, being discharged on the twenty-first day.

CASE 3. J. S. white female age 27 temperature 98 degrees, pulse 120, respirations 18 entered the hospital with an ectopic gestation. After blood clots were removed the pelvis was snabbed out with a 1 per cent solution of mercurochrome 220 soluble. The temperature remained low. The patient was discharged on the twenty-third day.

CASE 4. L. B. white female age 42 temperature 98 degrees, pulse 100, respirations 24, white blood count 12,000 polymorphonuclears 86 per cent, entered the hospital with a ruptured tube and free pus in the abdomen. The appendix and tubes were removed, the pus evacuated, drainage introduced and 1½ ounces of 0.5 per cent mercurochrome

220 soluble instilled into the peritoneal cavity. Temperature did not rise above 100. The patient recovered and was discharged on the thirty-fifth day.

CASE 5. G. A. white female age 30 temperature 99 degrees, pulse 82, respirations 22, white blood count 5,800 entered the hospital with a bowel obstruction due to angulation of the ileum, a portion of the gut gangrenous and a generalized peritonitis. Six inches of gut were resected, 1½ ounces of 0.5 per cent mercurochrome 220 soluble was introduced into the peritoneal cavity with drainage. There was a rise of 1 degree in the temperature in 24 hours. After 3 days the same amount of mercurochrome was again introduced into the cavity with no rise in temperature. The patient made a good recovery and was discharged on the thirtieth day.

CASE 6. M. H. white male age 30 temperature 97 degrees, pulse 108, respirations 24 entered the hospital with a lung abscess. It was drained and a large amount of pus evacuated. Dakin's solution was first used with negative results, then 1 per cent mercurochrome 220 soluble in 2 ounce installations at 3 day intervals. No rise in temperature was noted. The patient recovered and was discharged on the twenty-eighth day.

CASE 7. E. S. white male age 27 temperature 97 degrees, pulse 90, respirations 20, white blood count 18,000 polymorphonuclears 85 per cent, was found to have a hernial sac containing strangulated gut full of dark fluid, the gut being in very poor condition. After being freed the gut was wrapped in hot towels for 30 minutes, then the omentum painted over with a 1 per cent solution of mercurochrome 220 soluble and returned into the abdominal cavity. One half ounce of 0.5 per cent mercurochrome was poured into the wound. There was a rise of temperature of 1 degree in 24 hours. The patient recovered and was discharged after 26 days.

CASE 8. S. F. white female age 6 entered the hospital with a ruptured appendix and free pus in the abdominal cavity (probably of tuberculous origin). The appendix was removed and ½ ounce of 0.5 per cent mercurochrome 220 soluble introduced into the cavity. The patient died on the sixteenth day after developing meningitis symptoms probably of tuberculous origin.

CASE 9. J. W. C. male colored age 20 temperature 99 degrees, pulse 120, respirations 22, was found to have acute appendicitis with a large amount of pus in the abdomen and a generalized peritonitis. The appendix was removed and 1 ounce of 0.5 per cent mercurochrome 220 soluble introduced into the abdomen with drainage. The temperature rose to 101 degrees F in 24 hours. A like amount of mercurochrome was again introduced into the cavity in 48 hours with no rise in temperature. The patient recovered and was discharged on the fifty-third day.

CASE 10. A. B. male colored, age 22 temperature 93 degrees, pulse 120, respirations 24, white blood count 11,000 polymorphonuclears 82 per cent entered the hospital with a ruptured appendix, free pus in the abdomen and a generalized peritonitis. The appendix was removed and 1 ounce of 0.5 per cent mercurochrome 220 soluble was introduced with drainage. No rise of temperature followed. Introduction of 1 ounce mercurochrome was repeated in 36 hours. The patient recovered and was discharged on the thirty-third day.

can only be an individual attainment to the apprenticeship under a skilled workman must be added the years of practice until the art is acquired. And when the art is acquired one hears less discussion of method: the one sews with his right hand the other with his left. No good craftsman sticks to the same method under varying conditions for the material varies—be it stomach or small gut or large intestine—and all will vary according to the dissection process for which the surgeon is operating. Therefore the good craftsman aims at the finished result whether by one method or by another: if the angles of his lateral anastomosis do not suit him when united by a continuous stitch he will add perhaps an interrupted stitch tied on the inside but he will have forgotten the method in his interest in the result.

The choice of method by the master workman will be the final product of knowledge of his materials multiplied by experience: this raised to the nth power by the great guiding spirit of human activity—common sense—the final product being the thing called surgical judgment.

Even if this discussion should have served no end in helping to solve the problem of the technique of intra abdominal surgery, it would be worth the while if it but served to impress upon surgeons young and old that the peritoneum is a single layer of delicate cells thin, tenuous, transparent beyond the scope of the human eye, all essential to surgical success—a thing somewhat like the electric current—we cannot see it or touch it yet we can direct it—with care!

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CORRESPONDENCE

TISSUE DIAGNOSIS IN THE OPERATING ROOM

AND IMMEDIATE COVER-SLIP EXAMINATIONS OF ALL FLUIDS AND PUS¹

To the Editor I will consider it a courtesy if you will publish this letter in your journal as I am anxious to come into correspondence with pathologists and surgeons interested in the immediate examination of tissue by frozen section in the operating room and the immediate cover-slip studies of smears from all fluids and pus.

Microscopic examination of frozen stained sections has been possible for more than a quarter of a century. The staining of unfixed frozen sections with polychrome methylene blue and other stains is a well established procedure. In many operating rooms in both large and small universities and in surgical clinics provision for these immediate diagnostic studies have not only been available but have been in practical use for years. On the other hand unfortunately this diagnostic part of the operating room is conspicuous by its absence in many clinics.

Before 1915 it was rarely necessary for a surgeon well trained in gross pathology to need a frozen section to help him in diagnosis at the operating table. Since 1915 and especially since 1922 the public has become so enlightened that malignant disease formerly easily recognized either clinically or in the gross now appears in our operating rooms devoid of its easily recognized clinical and gross appearance and can be properly discovered only by an immediate frozen section. The majority of operating rooms are not equipped or prepared for this new diagnostic test.

The first essential part for this diagnosis is the technician—one to cut and stain the frozen section or to make and stain the smear. The second is a pathologist trained to interpret it. It is possible for the surgeon to be all three in himself and some young surgeons are so equipped. In others it is a dual combination—surgeon and pathologist in one and the technician. More frequently it is three—operator technician and pathologist. It makes little difference whether it is one two or three individuals provided one has the equipment and training for this most difficult diagnostic test.

In the address as chairman of the surgical section of the Southern Medical Association I discussed biopsy and this paper has been published. A reprint of this paper will be sent to anyone on request.

Schools for technicians may have to be established in different sections of the country and the surgical pathological laboratories of the medical schools and

the larger surgical clinics should offer courses in this tissue diagnosis so that surgeons may learn to become their own pathologists or pathologists learn the particular needs of the surgeon in tissue diagnosis in the operating room.

It is quite true that when the majority of the public are fully enlightened the surgeon will see lesions of the skin oral cavity and subcutaneous tumors when they are so small that their complete excision is not only indicated but possible without any mutilation. The chief danger here will be a surgical mistake—the incomplete removal of an apparently innocent tumor. There is no necessity here for biopsy. If a proper local excision is done no matter what the microscope reveals that local operation should be sufficient. But when lesions of the skin oral cavity and soft parts are extensive and their complete radical removal mutilating then there must be biopsy to establish the exact pathology.

In the past tumors of the breast and diseases of bone came to the surgeon at a stage when diagnosis could be made clinically or from the gross appearances at exploration. But now in an increasing number of cases the breast tumor must be explored and the gross pathology of the earlier stage is not sufficiently differentiated to allow a positive diagnosis. Immediate frozen sections are essential to indicate when the complete operation should be done. The same is true of the earlier stages of lesions of bone. The X rays no longer make a positive differentiation between many of the benign and malignant diseases for example sclerosing osteomyelitis and sclerosing osteosarcoma.

We must not only specialize in tissue diagnosis but we must organize this department so it will function properly in as many operating rooms as possible in this country.

Then there is a final and most difficult question to consider. I doubt if it can be settled. What shall be done in those operating rooms in which there is no technician to make the section and no one trained to interpret the microscopic picture? How can a piece be excised or a tumor removed for example from the breast and the tissue sent to some laboratory for diagnosis without incurring the risk of delay to the patient? I have discussed this point in my paper on biopsy.

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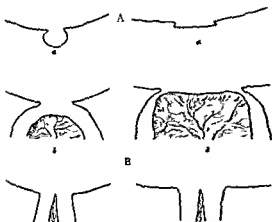


Fig. 1. A diagram showing the effect of extreme gastric dilatation on the stoma. A in the usual side-to-side gastro-jejunosomy (longitudinal jejunal incision). B in the new type of procedure (transverse jejunal incision). The normal stoma is represented in the usual procedure in A and B in cross section and longitudinal section respectively. In B, a longitudinal section through the stoma after a gastro-jejunosomy with a transverse jejunal incision. The dilated stomach is represented in A and B, and the mechanism of valve formation is illustrated in A and B, while in C the dilatation produces an enlargement of the torus.

The purpose of this communication is to report an experimental study of the application of the transverse jejunal incision to the usual gastro-jejunosomy.

EXPERIMENTAL METHOD

The end-to-side type of gastro-jejunosomy with transverse jejunal incision was performed on a series of 10 dogs.

A comparable series of the usual side-to-side gastro-jejunosomies were performed on 10 dogs. Except for the jejunal incision the operative technique and placing of the stoma were identical in the two series. In the side-to-side operation the stoma was made slightly larger than two fingers.

A constant site for the anastomosis was selected on the anterior surface of the mid-antral region of the stomach about 2 centimeters from and parallel to the greater curvature. In one half of the animals in each series a pyloric exclusion was performed by transverse division of the stomach just proximal to the pylorus with inversion of the cut ends. The conditions of after care were the same in all animals.

About one month after operation the animals were fasted over night and after a fluoroscopic



Fig. 2. A diagram illustrating the anastomosis distal to the stoma with the longitudinal jejunal incision (Cannon and Blake). With a transverse jejunal incision the gravitation of the intestinal loop produces no anastomosis but on the contrary maintains the patency of the stoma.

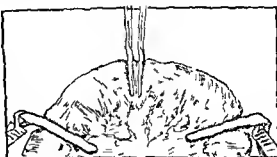


Fig. 3. The crushing clamps have been applied to the jejunum and an incision has been made across two thirds of the diameter of the intestine.

examination to determine whether the stomach was empty. They were given a semi-liquid feeding of 250 grams of a suspension of barium in potato starch and milk. A second fluoroscopic examination was made immediately and at intervals until the stomach was empty. The dogs were finally anesthetized with ether and the abdomen opened for examination of the anastomosis *in situ*.

OPERATIVE TECHNIQUE FOR GASTRO-jejunostomy WITH TRANSVERSE JEJUNAL INCISION

The procedure is identical with that previously described (4). The jejunum is lifted into position without rotation and with the proximal jejunal loop sufficiently long to avoid kinking. Two small crushing clamps are applied to the jejunum at the site selected for the anastomosis (Fig. 3). These clamps are placed side by side, extending transversely across two thirds of the diameter of the intestine. An incision is made between the clamps and their handles are allowed to separate (Fig. 4). This portion of the jejunum is then united to the cut end of the stomach by a row of interrupted silk sutures forming the posterior row. Small intestinal clamps are placed on the proximal and distal loops of the intestine. The crushing clamps are removed and the crushed

through the abdominal wall as a suprapubic tumor

In my earlier experience I followed the Kocher operation after a suitable interval by perineal operations for the cystocele and rectocele but I learned that these were not often essential. Drawing up the uterus after Kocher's method will draw up also as a rule both the rectocele and the cystocele obviating the necessity for plastic operations on the vagina. One of the causes of prolapse is that when the uterus descends it carries the bladder with it and when the prolapsed bladder is filled with urine it drops below the pubes, exerting a downward traction which increases the prolapse. By the Kocher operation the bladder is carried above the pubes like a child's bladder so that as it fills with urine it exerts an upward drag which undoubtedly is an important factor in bringing about permanent cure. On completion of the operation a self-retaining catheter may be introduced into the bladder and allowed to remain several days.

In elderly women with large prolapsus when the extruded cervix is eroded and in poor condition, the preliminary use of vaginal packs of glycerine tampons for some days is often advisable for restoration of the uterus to its normal situation to relieve the oedema and infection and to secure again the right of pelvic habitation. Cervical erosions with prolapse of the uterus are common but they seldom eventuate in cancer.

In making this suggestion for the use of the Kocher operation, I have in mind first the ease and safety of performance and the excellent results which follow and second a little remembrance of the work of one of the world's great surgeons.

Theodor Kocher was born August 25 1841 in Berne, Switzerland. At the age of 31 he was appointed professor of surgery at the

University of Berne a position which he held until the time of his death July 27 1917
W J MAYO

DUODENAL FISTULA—THE EFFECT OF THE LOSS OF GASTRIC, DUODENAL, PANCREATIC, AND BILIARY SECRETIONS FROM THE BODY

IN a previous editorial in this journal¹ attention was called to the chemical changes in the blood occurring in cases of clinical and experimental duodenal fistulas. Such changes are characterized by a decreasing concentration of chlorides, elevation of urea and a rise in the carbon dioxide combining power of the blood. In patients and in experimental animals the control of the toxæmia and the restoration of the blood to normal have been accomplished by the intravenous injection of large amounts of physiological sodium chloride solution. The similarity of these changes in the blood to those described by certain observers as associated with upper intestinal stasis has led to further studies of the rôle of disturbed gastro-intestinal continuity coincidental with duodenal fistula and the effect of the loss of gastric, duodenal, biliary and pancreatic secretions from the body through the fistula.

By isolating the duodenum as a separate loop and restoring gastro-intestinal continuity by gastrojejunostomy, loss of gastric secretion is prevented but duodenal, pancreatic and biliary secretions are discharged from the body at the lower end of the duodenum is left open and incorporated in the abdominal wound. By transplanting the major pancreatic duct and the common bile duct into the jejunum and ligating the minor pancreatic duct the pan-

¹The toxæmia following duodenal and gastric fistula. *Surg. Gy. & Obst.*, Feb. 21, 1915, 845-850.

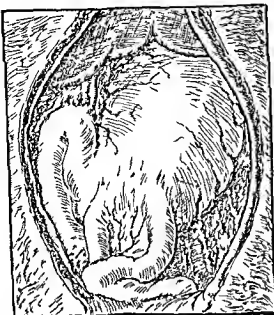


Fig. 6 The drawing illustrates the usual gastro-enterostomy with longitudinal jejunal incision as it appeared *in situ* after complete healing. Although there was no evidence of stasis in this animal, a comparison with Figure 5 shows a flattening of the jejunal wall in the area of division of circular muscle fibers. One can readily see how the natural tendency for the loops to gravitate downward is an advantage with the transverse jejunal incision (Fig. 5) but would tend to produce an angulation and possibly an obstruction with the usual longitudinal jejunal incision (Fig. 6).

marked as the kinking which Cannon and Blake described but was nevertheless an added mechanical disadvantage and probably contributed to the retention. There were no adhesions producing a constriction or causing an angulation of the gut. In the third dog the retention was less marked. By radiographic examination the stomach was moderately dilated and emptied slowly—20 per cent of the barium and considerable fluid remaining after 5 hours. At autopsy the stomach was found to be distended to half again its normal size. The stoma was stretched and the intestinal wall over it flattened but to a lesser degree than in the other 2 cases of obstruction. The angulation of the jejunum at the distal end of the anastomosis was also apparent in this case. Of the 3 dogs showing evidence of obstruction, 2 had had a pyloric occlusion and the third had not.

It is of course only possible to surmise the sequence of events in these cases of retention. It is probable that the dogs took too much food and water producing distention with the concomitant

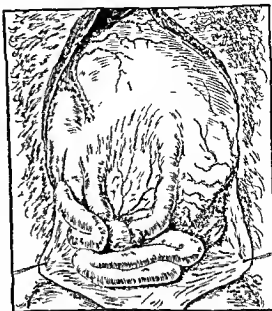


Fig. 7 The drawing illustrates an instance of a dilated stomach after the usual gastro-enterostomy (longitudinal jejunal incision) with the valve formation described by Cannon and Blake. There is moderate angulation of the jejunal loop at the distal end of the stoma. The stasis is due to this valve formation and angulation which has been observed in several instances (3 in 10) with the usual gastro-enterostomy with longitudinal jejunal incision but in no instance with a transverse jejunal incision.

valve formation by the stretched stoma associated with angulation of the gut at the distal end of the anastomosis. This condition once established will tend to become gradually worse by the accumulation of the normal secretions or by the further ingestion of food and water and finally results in the end picture of chronic obstruction described above.

SUMMARY

The faulty mechanics of the usual side to side gastrojejunostomy are in large part due to the division of the circular muscle fibers by the longitudinal jejunal incision.

A method of anastomosis (4) has been previously described whereby the jejunum is incised transversely rather than longitudinally in order to avoid division of the circular muscle fibers. The theoretical advantages in this procedure are several. The circular muscle fibers are not severed and accordingly there is a minimal interference with peristalsis; the intestinal loops gravitate downward without kinking in the ideal mechanical position and finally distention of the stomach

MASTER SURGEONS OF AMERICA

SAMUEL W. GROSS

It is a common observation that distinguished men seldom have distinguished progeny and this unfortunately applies to medicine as well as to other walks in life. In literature occasionally the mantle of the father has fallen on the son and has been worn gracefully but such cases are exceptional. In American medicine we have a few instances particularly in Boston and Philadelphia where ability, diligence and ambition seem to have been inherited by or inculcated in a second or even a third generation, but as a rule the sons of a distinguished father are contented to live and die in a reflected glory.

Most men who have risen to great heights in their profession have done so not only in spite of but because of handicaps and obstacles the most common being poverty and a lack of preliminary education. Naturally one of the objects in the life of such men is to remove these hindrances from the path of their offspring so that their ascent may be rendered less arduous. Human nature unfortunately seems to be so constituted that effort is born largely of necessity and material comforts stunt ambition and initiative. Wealth is consequently the poorest inheritance a father can pass on to a son unless with it goes a love of knowledge and a sense of responsibility. Undoubtedly something worked for and attained be it wealth or knowledge or accomplishment has a higher value and is more stimulating than the same thing easily procured.

It is a pleasure therefore to contemplate the life of a distinguished son of an equally or more distinguished father and that is the object of this brief review of the skill and accomplishments of Samuel W. Gross. The life of the Elder Gross has recently been set before the readers of this journal by the inimitable J. Chalmers Da Costa and the present writer recently endeavored to present him from a little different angle. It is hard to write of the son without constantly thinking and writing of the father who was for so many years the most distinguished and most honored American surgeon. The father overcame his environment and grasped his opportunities the son profited by his environment and appreciated his opportunities. A consideration of the two lives together can only produce the conclusion already mentioned that knowledge and accomplishment attained by constant struggle are apt to lead to greater heights than those come by easily.

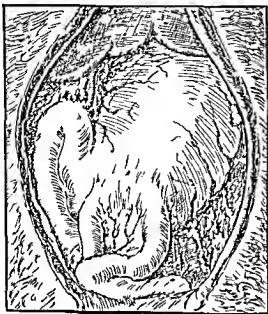


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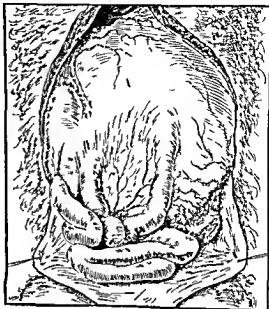


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THE UTILIZATION OF THE ROUND LIGAMENTS IN TUBAL STERILIZATION

By J. HOFBAUER, M.D. BALTIMORE, MARYLAND
Assoc. Professor Obstetrics and Gynecology

DURING the past few years the question as to the best method of effecting tubal sterilization has been vigorously discussed following a change in the whole aspect of the problem resulting from reports of failures incident to the favorite method—double ligation of the tubes with division between them. In this connection the familiar fact may be adduced that in some of those cases the lumen of the tube has become restored after absorption of the ligatures or a tubo-abdominal fistula has become established followed by pregnancy. Much information as to the mechanism involved in such occurrences has been derived from the experiments of Fraenkel and Nuernberger.

The difficulty of rendering a woman either permanently or temporarily sterile by an operation upon the tubes is reflected in the numerous attempts which have been made to accomplish this object. The method suggested for conferring temporary sterilization on patients by burying the fimbriated end of the tube in the broad ligament has proved not infallible (Hofmeister, Keifferscheid, Ruehl, Muret). For insuring against conception in such cases during a temporary contra-indication to pregnancy it has been suggested therefore by Menge to place the fimbriated end of the tube outside of the abdominal cavity by means of a modified Alexander-Adams operation. This procedure when properly performed is undoubtedly efficient. It constitutes however an operation *per se* and whenever the abdominal cavity is being opened for caesarean section or hysterotomy an abdominal method for tubal sterilization is more desirable.

To achieve the purpose of sterilization there are at present two operations in vogue: burying the proximal ends of the tubes between the folds of the broad ligament or excising the tubes at the cornua of the uterus by wedge-shaped incisions. The latter procedure is certain in its results but if pregnancy seems desirable at some future time a second operation to reimplant the tubes into the uterine cornua would offer but problematical results. Failures after inserting the proximal ends of the tubes in the broad ligament have been reported by Keifferscheid, Leonard and Nuernberger. Moreover I think it safe to say that the data available

in the literature apparently do not fully represent the actual number of failures since their occurrence is frankly admitted by several surgeons in casual conversation. As a matter of fact, Williams observed no untoward results in his series of operations. While I am not prepared to discuss the factors which might probably operate in causing these failures such facts cannot be swept aside with indifference if we are to obtain a clear basis for judgment. Furthermore a number of obstetricians hesitate to open the upper part of the broad ligament when they are confronted with excessive engorgement of the veins in that area for fear of hemorrhage or thrombosis. Moreover the following fact has to be borne in mind. It is sometimes difficult to bury the ends of the tubes satisfactorily on account of the very delicate structure of the upper part of the broad ligaments and if an attempt is made to spread them apart, the tissues may be so torn that it becomes necessary to excise the cornual end of the tube by a wedge-shaped incision (Williams). The facts here stated seem to bear out the view that the methods available today have not entirely solved the problem so that desirability of obtaining a simple but effectual method of tubal sterilization still exists.

The considerations brought forth induced me to utilize the round ligaments in tubal sterilization for obstetrical and gynecological indications in obstetrics following caesarean section or hysterotomy in gynecology associated with interposition for placenta. The operation described here is readily effected and can be performed in either of two ways.

Method 1. After the fallopian tube has been cut its proximal end is ligated with silk the suture being left with long ends. One end of this suture is then inserted through the round ligament on one side while the other end passes through the ovarian ligament. Consequently, when the ends of the suture are pulled together the round and ovarian ligaments will be approximated over the cut end of the tube so that they eventually envelop it in a blind cul-de-sac when tied closely (suture 1 in diagram). Because of the possibility that the end of the tube might project slightly below the fold produced by suture 1 a second suture is inserted about 1 centimeter below it but

since 1917 with uniformly good results. It is evident that this operation is applicable to every case since it is not contra indicated by complications existing within the broad ligament. For operations by the vaginal route method 2 is preferable since the approximation of the round and the ovarian ligament might be rather difficult in some cases. The essential difference between the routine method of burying the tube between the folds of the round ligament and the method described above lies in the fact that in the latter case the cut proximal end of the tube is covered with the comparatively thick muscular layer of the round ligament, thus obviating the action of any factor which might result in perforation of the peritoneum (mechanical traction or chemical ferment). In such circumstances when a merely temporary sterilization is intended a second operation would unite the liberated ends of the

tube whenever pregnancy in some future time seems desirable. In one of my cases pregnancy occurred after the tube's had been made free and a fresh cut surface of the tubes was established.

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THE BALKAN FRAME AND ITS USE IN GENERAL SURGERY¹

By ARTHUR C. JOHNSON, M.D., ROCHESTER, MINNESOTA

Filed May 24, 1916

THIS poorly nourished patient weakened by malignant disease of long standing often presents serious problems of postoperative treatment. Decubitus ulcer, hypostatic pneumonia, delayed healing of wounds and wasting of muscle tissue are all encountered following a prolonged or at times even a short stay in bed by the patient with malignant disease and appropriate preventative and curative measures for such complications and sequelae should be at the hand of every surgeon for the comfort of the patient post-operatively.

The adoption of the Balkan frame marked a great advance in the care and comfort of certain orthopedic patients. Recently a Balkan frame equipped with an overhead swinging crossbar (Fig. 1) has been used for 4 patients, 2 males and 2 females, who had undergone posterior resection (the Kraske operation) for carcinoma of the rectum. The aid afforded the nurses in attendance by this device the decreasing amounts of morphine necessary and the uniformly enthusiastic praise from the patients encouraged this report.

The device is especially suitable for patients who must submit to the two-stage Kraske operation. Preliminary colostomy is performed through a left rectus or left inguinal incision, splitting the

muscle. The patient remains in bed for approximately 10 days before being allowed up. During this period a debilitated patient tends to continue to lose muscle tonus; the musculature is soft and flabby and the constitutional weakness and loss of strength initiated by the malignant condition progresses further. Care of the skin is of prime importance as pressure dermatitis even to the point of ulcer formation is not uncommon. Dehydration, loss of the subcutaneous fatty layers and the pressure sustained on bony prominences as over the sacrum, the anterior iliac spines and the trochanters of the femurs readily account for these stages.

The second stage or posterior excision of the rectum is usually undertaken at the end of the twelfth to the fourteenth day if the patient's general condition permits and sacral anesthesia and light gas-oxygen anesthesia are used in case the peritoneum is opened or incised and traction is applied. The structures of the pelvic floor principally the levator ani, rectococcygeal and coccygeal muscles with the pelvic fascia are severed and rendered functionless. On being transferred to bed the patient is placed on his side. With a colostomy wound anteriorly and an extensive wound with bulky dressing pads in place poste-

AVULSION OF THE HEEL¹

BY RALPH COLP, M.D., F.A.C.S., NEW YORK CITY

AVULSION of the heel either complete or incomplete while not a common accident is certainly not a surgical rarity in industrial hospitals. If not treated properly it may become a serious condition because certain anatomical features of this region make it the easy prey of chronic ulceration. Ulcers of the heel when once formed are disabling and annoying to the patient and usually resistant to most forms of medical therapy. The problem which these cases present depends upon the period at which the patient applies for treatment and is best illustrated by reviewing cases each exemplary of a group. In Case 1 the patient was treated from the time of his initial injury. In Case 2 the patient applied for relief from a chronic ulcer of the heel which he had had for over a year.

The mechanism producing this injury is either a heavy glancing blow applied directly to the heel or the posterior part of the foot is crushed between two approximating forces which may be of sufficient strength not only to cause avulsion of the heel but a fracture of the os calcis in addition.

The treatment depends upon the pathological changes present. Whenever possible the wounded heel should be thoroughly cleansed and debridement carefully done after which the heel should be replaced by accurate suturing. In a great many of these cases healing will take place by primary union. The torn tissue in a certain number of cases subsequently will become gangrenous and slough away and a defect of greater or lesser extent be left. If the area is quite small and superficial healing may occur by secondary intention and the resulting scar if adequately protected may never cause the patient any trouble. On the other hand it is a grave error to temporize when the heel is completely torn away or secondary gangrene has resulted from exposure of the Achilles tendon and part of the os calcis. These large defects are only temporarily healed by scar tissue formation for as soon as the patient walks about in shoes the skin invariably breaks down. It is an economic waste of time to treat large chronic ulcers of the heel conservatively. They can be cured only by radical surgical intervention. The defect or scar tissue present must be replaced by a transplant including skin and subcutaneous tissue liberally supplied with fat. Any operation not embodying all of these specifications will usually result in failure. Thiersch

Reverdin or Wolf grafts will not answer the purpose the only satisfactory procedure is the use of a pedicle graft with a liberal supply of subcutaneous fat. The general rules which apply to pedicled grafts for other areas of the body apply here.

The comfort of the patient should be borne in mind when an area for the pedicled graft is selected even though any position if maintained for a prolonged period will become unbearable and no matter what precautions are taken these patients will be miserable. Opiates should be used liberally to alleviate their suffering. The area selected should have a good blood supply and the tissues should be liberally supplied with fat. All these requirements seemed fulfilled best by using the anterior aspect of the upper third of the thigh. When the heel is elevated to this location the position obtained is comparatively and relatively comfortable for the patient the pedicle is well nourished and without tension and the graft secured quite desirable for the purpose.

It is very important at the operation to cover the muscular base left bare by the elevation of the pedicle with Thiersch grafts. This accomplishes many things. It prevents maternally the constant secretion which would otherwise come from a raw area. This not only diminishes the chances of infection but adds to the comfort of the patient because dressings which are painful need to be done less frequently. In addition it shortens the period of convalescence and diminishes the chances of scar tissue formation and contraction which in the upper third of the thigh might seriously restrict the free movements of the quadriceps femoris. These Thiersch grafts should be covered with paraffine mesh liberally supplied with sterile gauze and the entire dressing should be encased by sterile rubber dam. This forms an impermeable membrane between the thigh wound and the uncovered granulating heel which because of necessity must rest on the rubber dam.

Before the pedicle is cut the heel which has now been covered with clean healthy granulations and freed of all scar tissue is scrubbed with soap and water for at least 5 minutes and then washed with alcohol and ether. Debridement of the thin line of fresh epithelium from the periphery of the wound is carefully done. Any troublesome oozing may be controlled by the ap

pedicle graft was cut in the region of the anterior aspect of the upper third of the left thigh measuring about 3 inches in width and about 5 inches in length. The base of the graft ran parallel to the part's limb. The thickness of the graft included all tissues between the skin and the deep fascia of the thigh. The muscular surface which had been left bare by raising the pedicle was carefully covered with Thiersch skin grafts which had been removed from the anterior aspect of the right thigh. These grafts were covered with paraffine gauze and gauze dressings over which a rubber dam was applied. The right heel was then brought up to the anterior aspect of the left thigh and the periphery of the graft was sutured to the periphery of the wound of the heel for about 200 degrees of its extent with interrupted silkworm gut sutures. Two sutures were passed parallel to the long axis of the graft through it and the heel so that the graft was firmly attached to the underlying granulations covering the posterior aspect of the os calcis. In order to permit secretions to escape through the graft it was perforated in several places with a Dakin punch. The parts involved were then rendered immobile by a plaster piece which completely encased the lower half of the body. The area of the graft itself was simply covered with paraffine gauze overlaid with a sterile towel so that inspection could be made without removing cumbersome dressings.

December 12. The graft was completely viable. Under novocain anesthesia the pedicle which was firmly attached was incised for a distance of about 1 inch on each side at its base. There was free bleeding from the distal segment.

December 21. Under novocain anesthesia the pedicle was entirely divided and the free portion of the flap was sutured to the remaining free skin edge of the heel with interrupted silkworm gut. The plaster cast was removed and the area covered by the Thiersch grafts was dressed for the first time. It was found that all the grafts had taken. The patient was discharged January 5, 1926 with the heel completely healed. He was last seen June 23, 1926 and was able to walk about perfectly. The heel was still completely healed.

CASE 2. H. C. age 1 year, male, occupation handy man was admitted to the surgical service of the Beckman Street Hospital March 6, 1926 and discharged July 3, 1926. Fourteen months before admission the right heel had been crushed between the struts and the platform of a moving elevator. The patient was removed to a hospital where he received conservative treatment, rest in bed and the local application of wet dressings. In spite of the fact that the wound which involved practically the entire heel contracted down to about the size of a fifty cent piece, a chronic ulcer remained and it was necessary for the patient to be dressed about three times a week. Because of this condition he was unable to secure employment.

Physical examination was normal except for the surgical condition. The entire heel was a mass of scar tissue

except for a granulating area about the size of a fifty cent piece on the posterior medial aspect of the right heel. The granulations were pale and sickly in appearance. The os calcis seemingly lay beneath the scar tissue and the granulating area. There was a deformity of the foot from a contraction of the flexors of the leg resulting in apparent talipes equinus.

Röntgen examination of the foot showed an old complete fracture of the os calcis about midway through its body. This had now healed with the posterior fragment turned markedly to the inner side and that it was a comminuted fracture was indicated by a hole through the outer side of the bone. There was a rather large deforming callus present.

Course April 3. Part of the scar tissue about the heel was excised and about a dozen holes were drilled into the os calcis with the hope that granulations might spring up from the medulla covering the cortex with healthy granulations. The leg was placed in a plaster cast with the foot in complete dorsiflexion.

April 13. The wound was clean and granulations were flourishing and were beginning to cover in the wound. There was still much scar tissue surrounding the area of granulations and this would have to be removed before any attempt at pedicle grafting was made.

April 28. All scar tissue was removed and another dozen holes drilled into the os calcis.

May 7. An area about 5 by 3 inches was covered in place with healthy granulations.

May 10. The wound was thoroughly cleansed with green soap and water and 20 more holes were drilled into the os calcis.

An X-ray picture of the heel at this time did not disclose any infective osteomyelitis.

May 16. The entire heel was covered with granulations of healthy appearance. The cast was removed.

May 17. Operation. A pedicle graft from the anterior aspect of the left thigh was attached to the right heel for a large ulcer involving the posterior portion of the heel extending from its inferior margin upward on the Achilles tendon for the extent of 5 inches. The transverse diameter of this was about 3 inches. The technique of this operation was identical with that employed in Case 1.

May 21. The pedicled graft was completely divided. The area which had been covered with Thiersch grafts was dressed and it was found that all of the grafts apparently had taken.

June 1. The pedicled graft which had been left free was now sutured in place with interrupted silkworm gut sutures. Following this there was some sloughing in the superior part of the grafts which on June 17 was covered with 5 small punch grafts. July 3 the patient was discharged.

The patient was seen August 10, 1926. The heel had completely healed with excellent functional results.

CASE 11 J F male colored age 19 temperature 98 degrees pulse 130 respirations 22 entered the hospital with an obstruction of the bowel caused by a narrow band of adhesions over lower ileum. The intestines above the obstruction were in poor condition and some fluid was found in the abdominal cavity. One ounce of 0.5 per cent mercurochrome 220 soluble was introduced with a catheteric drain. The temperature remained normal. The patient recovered and was discharged on the fourteenth day.

CASE 12 L I L white female age 36 temperature 100 degrees entered the hospital on January 8, 1915 with an ectopic pregnancy and an enormous hemorrhage. The mass was removed, 1 ounce of 0.5 per cent mercurochrome 220 soluble was introduced and the wound closed with drainage. Temperature went to 103 on third day. The patient recovered and was discharged on the sixth day.

CASE 13 N B white male age 36 temperature 98 degrees pulse 90 respirations 24 white blood count 10,000 polymorphonuclears 68 per cent was found to have a ruptured gangrenous appendix and a large pus cavity walled off. The appendix was removed, the pus evacuated and 1 ounce of 1 per cent mercurochrome 220 soluble was introduced with drainage. Obstruction symptoms supervened on the fourth day with temperature normal (101.2). One ounce of 0.5 per cent mercurochrome 220 soluble was introduced into the cavity and the lower portion of the ileum drained through the abdominal wall. The patient recovered and was discharged on the seventh day.

CASE 14 R J white male age 22 temperature 99 degrees pulse 118 respirations 28 entered the hospital with left empyema. The chest wall was incised between the sixth and seventh ribs, 3 liters of pus evacuated and drainage introduced. On the sixth day 1 ounce of 1 per cent mercurochrome 220 soluble was injected into the cavity and the same amount again on the eighth and twelfth days. The patient left the hospital greatly improved on the twenty-first day with a small amount of drainage still continuing and eventually made a complete recovery.

CASE 15 E B colored female aged 13 temperature 102 degrees pulse 104 respirations 24 white blood count 17,000 polymorphonuclears 94 per cent entered the hospital with a retrocecal appendicular abscess. The appendix was removed, the abscess drained out thoroughly, swabbed with 1 per cent mercurochrome 220 soluble and the wound closed with 3 drains. The temperature came down and healed around 9 days. The patient recovered and was discharged on the twenty-eighth day.

CASE 16 D A white female age 55 temperature 100.2 degrees pulse 120 respirations 20 entered the hospital with a ruptured gangrenous appendix, a large amount of free pus in the abdomen and a generalized peritonitis. The patient's general condition was bad. The appendix was removed, pus drained off and 4 ounces of 1 per cent mercurochrome 220 soluble introduced into the cavity with 1 flank and 2 anterior drains. The temperature rose 3 degrees in 6 hours and came down to 101 after 9 hours. The patient recovered and was discharged on the twenty-first day.

CASE 17 R B white male age 40 temperature 98 degrees pulse 100 respirations 24 entered the hospital with a urethra ruptured at the neck of bladder. A suprapubic cystostomy was performed and a drainage tube introduced

through the bladder and on through the urethra. 2 quarts of bloody urine being found in the bladder. The bladder was irrigated with boric acid solution followed by 3 ounces of 1 per cent mercurochrome 220 soluble. There was no rise of temperature. Installations of mercurochrome were repeated every third day and boric acid solution twice daily. The patient was discharged on the forty-ninth day after complete recovery.

CASE 18 G S white male age 56 temperature 99 degrees pulse 96 respirations 24 white blood count 10,000 polymorphonuclears 94 per cent entered the hospital with a gangrenous ruptured appendix, a large amount of free pus in the abdomen and a generalized peritonitis. The appendix was removed and 2 ounces of 0.5 per cent mercurochrome 220 soluble was introduced with flank and central drainage. The same amount of mercurochrome was introduced again on the third day. On the fourth day the white blood count was 6,000 polymorphonuclears 4 per cent. The urine contained albumin and many coarsely granular casts. The patient had chronic nephritis and died on the ninth day.

CASE 19 C C colored female age 60 temperature 98 degrees pulse 96 respirations 24 white blood count 10,000 polymorphonuclears 81 per cent entered the hospital with an acute catarrhal appendix, a ruptured right tube and the abdomen full of free pus. The appendix and tubes were removed and 2 ounces of 0.5 per cent mercurochrome 220 soluble introduced with drainage. Four hours after operation the temperature rose to 101, pulse 138 and remained so 24 hours. The patient recovered and was discharged on the twenty-fifth day.

CASE 20 R M white male age 16 had a temperature of 99.8 degrees pulse 94 respirations 22 white blood count 13,000 polymorphonuclears 93 per cent. A swollen appendix was removed, also a Meckel's diverticulum perforated by a toothpick which the patient had swallowed and two ounces of 0.5 per cent mercurochrome 220 soluble were introduced with a small cigarette drain which was removed after the first day. There was no rise of temperature. The patient made an uneventful recovery and was discharged on the eighth day. (This case was reported in the *Journal of the American Medical Association* May 29, 1920.)

CASE 21 J M white male age 13 temperature 99 degrees pulse 100 respirations 24 white blood count 12,000 polymorphonuclears 89 per cent entered the hospital with a ruptured appendix, a large amount of free pus in the abdomen and a generalized peritonitis. The appendix was removed and 1 1/2 ounces of 1 per cent mercurochrome 220 soluble was introduced with drainage. The temperature rose 1 degree in 24 hours. The patient recovered and was discharged on the thirty-fifth day.

In view of the severity of the 21 cases and of the remarkably good results obtained in 19 out of the 21 I am led to the conclusion that the use of mercurochrome 220 soluble was the controlling factor. I consider that the direct application of mercurochrome to the source of the infection, whether in the peritoneal, thoracic or other cavities is indicated.

CASE 11 J E male colored age 19 temperature 98 degrees pulse 130 respirations 22 entered the hospital with an obstruction of the bowels caused by a narrow band of adhesions over lower ileum. The intestines above the obstruction were in poor condition and some fluid was found in the abdomen. One ounce of 0.5 per cent mercurchrome 220 soluble was introduced with a cigarette drain. The temperature remained normal. The patient recovered and was discharged on the fourteenth day.

CASE 12 L I white female age 36 temperature 100 degrees entered the hospital on January 8, 1925 with an ectopic pregnancy and an enormous hemorrhage. The mass was removed. 1 ounce of 0.5 per cent mercurchrome 220 soluble introduced and the wound closed with drainage. Temperature went to 101 on third day. The patient recovered and was discharged on the sixteenth day.

CASE 13 N B white male age 35 temperature 98 degrees pulse 90 respirations 22 white blood count 12,000 polymorphonuclears 68 per cent was found to have a ruptured gangrenous appendix and a large pus cavity walled off. The appendix was removed, the pus evacuated and 1 ounce of 1 per cent mercurchrome 220 soluble introduced with drainage. Obstruction symptoms supervened on the fourth day with temperature normal. One ounce of 0.5 per cent mercurchrome 220 soluble was introduced into the cavity and the lower portion of the ileum drained through the abdominal wall. The patient recovered and was discharged on the seventy-seventh day.

CASE 14 R J white male age 2 temperature 99 degrees pulse 128 respirations 28 entered the hospital with left empyema. The chest wall was incised between the sixth and seventh ribs, 2 liters of pus evacuated and drainage introduced. On the sixth day 1 ounce of 1 per cent mercurchrome 220 soluble was injected into the cavity and the same amount again on the eighth and twelfth days. The patient left the hospital greatly improved on the twenty-first day with a small amount of drainage still continuing and eventually made a complete recovery.

CASE 15 E B colored female aged 13 temperature 102 degrees pulse 104 respirations 4 white blood count 17,000 polymorphonuclears 94 per cent entered the hospital with a retrocecal appendiceal abscess. The appendix was removed, the abscess cleaned out thoroughly swabbed with 1 per cent mercurchrome 220 soluble and the wound closed with 2 drains. The temperature came down and hovered around 99. The patient recovered and was discharged on the twenty-eighth day.

CASE 16 D N white female age 15 temperature 100.2 degrees pulse 120 respirations 26 entered the hospital with a ruptured gangrenous appendix, a large amount of free pus in the abdomen and a generalized peritonitis. The patient's general condition was bad. The appendix was removed, pus drained off and 4 ounces of 1 per cent mercurchrome 220 soluble introduced into the cavity with 1 flank and 2 anterior drains. The temperature rose 3 degrees in 6 hours and came down to 101 after 9 hours. The patient recovered and was discharged on the twenty-first day.

CASE 17 R B white male age 40 temperature 98 degrees pulse 100 respirations 24 entered the hospital with a urethra ruptured at neck of bladder. A suprapubic cystotomy was performed and a drainage tube introduced

through the bladder and on through the urethra. 2 quarts of bloody urine being found in the bladder. The bladder was irrigated with boric acid solution followed by 3 ounces of 1 per cent mercurchrome 220 soluble. There was no rise of temperature. Installations of mercurchrome were repeated every third day and boric acid solution twice daily. The patient was discharged on the forty-ninth day after complete recovery.

CASE 18 G S white male age 56 temperature 99 degrees pulse 96 respirations 24 white blood count 10,000 polymorphonuclears 94 per cent entered the hospital with a gangrenous ruptured appendix, a large amount of free pus in the abdomen and a generalized peritonitis. The appendix was removed and 2 ounces of 0.5 per cent mercurchrome 220 soluble was introduced with flank and central drainage. The same amount of mercurchrome was introduced again on the third day. On the fourth day the white blood count was 6,000 polymorphonuclears 74 per cent. The urine contained albumin and many coarsely granular casts. The patient had chronic nephritis and died on the ninth day.

CASE 19 C C colored female age 20 temperature 98 degrees pulse 96 respirations 24 white blood count 10,000 polymorphonuclears 81 per cent entered the hospital with an acute catarrhal appendix, a ruptured right tube and the abdomen full of free pus. The appendix and tubes were removed and 2 ounces of 0.5 per cent mercurchrome 220 soluble introduced with drainage. Four hours after operation the temperature rose to 101, pulse 135 and remained so 24 hours. The patient recovered and was discharged on the twenty-fifth day.

CASE 20 R M white male age 16 had a temperature of 99.8 degrees pulse 94 respirations 22 white blood count 13,000 polymorphonuclears 93 per cent. A swollen appendix was removed also a Meckel's diverticulum perforated by a toothpick which the patient had swallowed and two ounces of 0.5 per cent mercurchrome 220 soluble were introduced with a small cigarette drain which was removed after the first day. There was no rise of temperature. The patient made an uneventful recovery and was discharged on the eighth day. (This case was reported in the *Journal of the American Medical Association* May 29, 1926.)

CASE 21 J M white male age 13 temperature 99 degrees pulse 100 respirations 24 white blood count 12,000 polymorphonuclears 89 per cent entered the hospital with a ruptured appendix, a large amount of free pus in the abdomen and a generalized peritonitis. The appendix was removed and 1 1/2 ounces of 1 per cent mercurchrome 220 soluble was introduced with drainage. The temperature rose 1 degree in 24 hours. The patient recovered and was discharged on the thirty-fifth day.

In view of the severity of the 21 cases and of the remarkably good results obtained in 19 out of the 21 I am led to the conclusion that the use of mercurchrome 220 soluble was the controlling factor. I consider that the direct application of mercurchrome to the source of the infection, whether in the peritoneal thoracic or other cavities is indicated.

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

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JUNE 1927

THE KOCHER ABDOMINAL FIX- ATION FOR CERTAIN TYPES OF PROLAPSE OF THE UTERUS

MORE than 25 years ago I first visited Theodor Kocher's clinic at Berne Switzerland. I was very much interested at that time in an operation which Kocher was performing for prolapse of the uterus which was so simple and so generally applicable to aged women that I have practiced it in certain groups of cases since with great satisfaction.

I visited Kocher's clinic again in 1913. At that time he was 72 years of age but strong and vigorous carrying on his work with his accustomed energy. He had remembered all those years my interest in his operation for prolapse of the uterus and with great kindness took the trouble to have present at his clinic for examination 17 women of different ages on whom he had operated for this condition. In each case some years had elapsed since the operation and every patient had been cured. A number of his patients were in the child-bearing period but in these he severed the attachment of the fallopian tubes and ovaries

to the horn of the uterus and dropped the tubes and ovaries inside the abdomen. I have never used the operation for a patient in the childbearing period. In younger women plastic operations for the rectocele and cystocele combined with shortening of the round ligaments by the external or internal method of Alexander give satisfactory results. In those forms of prolapse of the uterus so frequently found in the menopause period the C. H. Mayo type of operation of restoration of the pelvic floor is satisfactory.

There have been many modifications of the Kocher operation which have rendered it more difficult and while I have had no experience with the changes in procedure I do not believe they possess any substantial advantages over the original procedure.

The operation of Kocher is simple and can be performed in a few minutes under a local anæsthetic with a little general anæsthetic during the intraperitoneal manipulation.

A suprapubic incision is made in the median line large enough to permit any necessary examination of the abdominal viscera. The uterus is then drawn up into the abdominal incision in such a manner that the uterus at the level of the internal os can be readily sutured to the parietal peritoneum. All the way around the body of the uterus is then sutured to the muscles and the aponeurosis. In the maneuver the bladder comes up with the uterus and the anterior space is closed by suturing the peritoneum to the cervix so that there will be no danger of subsequent internal hernia. The abdominal incision is closed in the usual manner. After the wound is healed the fundus of the uterus can be readily felt

creatic and biliary secretions are retained in the gastro intestinal tract while the duodenal secretion without the constituents of the transplanted ducts, is discharged from the duodenum through the fistula.

When duodenal pancreatic and biliary secretion is lost from the body by discharge from the isolated loop of duodenum after the restoration of gastro intestinal continuity by gastrojejunostomy practically no change occurs in the chlorides or carbon dioxide combining power of the blood. In such animals acid gastric secretion is not a part of the duodenal fluid because of the gastrojejunostomy and hence is not discharged from the body. This is in contrast to the condition when acute duodenal fistula is discharging gastric secretion in which a lowering of blood chlorides, an increase in the carbon dioxide combining power of the blood and of the urea occurs. However animals discharging pancreatic biliary and duodenal fluid from the isolated loop of duodenum die within 7 days in spite of restoration of gastro intestinal continuity and regardless of whether sodium chloride is given intravenously. If the loss of pancreatic and biliary secretion is prevented by transplanting these ducts into the jejunum the dogs live indefinitely. One such dog has lived more than 4 months and is in good condition.

Experiments were carried out by transplanting the common bile duct into the jejunal loop of the gastrojejunostomy in certain dogs and in others by transplanting the pancreatic duct

Dogs in which the pancreatic secretion discharged from the loop of isolated duodenum invariably died early while those in which the loss of pancreatic fluid was prevented by transplanting the major pancreatic duct into the jejunal loop and ligating the minor pancreatic duct did not die even though bile and pure duodenal secretion were being discharged from the open end of the isolated loop of duodenum. This seems to show that pancreatic fluid is necessary for life and is in accord with the work of Elman and McCaughan¹.

These experiments further support our earlier contentions that the decrease in blood chlorides and carbon dioxide combining power of the blood in duodenal fistula is due in part to loss of these constituents of gastric secretion from the body by discharge through the fistula. There is also experimental evidence which seems to show that when there is interference with gastro intestinal motility, the chlorides are lost from the body by their excretion into the intestinal tract and their discharge through a duodenal fistula or in the feces and urine. The disturbance in gastro intestinal continuity secondary to the fistula causes greater excretion of chlorides through the fistula and in the urine and fecal fluid and a greater decrease in blood chlorides.

WALTMAN WALTERS